ELECTRICAL REVIEW

[ILLUSTRATED.]

A WEEKLY JOURNAL OF

ELECTRIC LIGHT, TELEPHONE TELEGRAPH AND SCIENTIFIC PROGRESS.

Vol. 10. No. 9. WEEKLY. NEW YORK, SATURDAY, APRIL 30, 1887. $3 per annum. Single Copies, 6 Cents.

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Entered at Post Office, New York, as Mail Matter of the Second Class.

Recent Improvements in the United States System of Electric Lighting.

We illustrate in this edition some of the new and improved appliances of the United States Electric Lighting Company, designed for use with their incandescent system.

Figure 1 is the ammeter, which is placed directly in the main circuit, and registers with great accuracy the number of amperes being used on the circuit. For an instrument designed to measure directly very heavy currents, it is unusually reliable, and has the merit of simplicity and elegance and neatness of design and workmanship possessed by all the instruments made by this company.

Figure 2 is the latest form of United States lamp, and is one of the most efficient and durable lamps on the market. Lamps of this form are made of various grades designed for use with currents of from 70 to 110 volts electromotive force, requiring less than four watts per candle for sixteen candle power lights. With lamps of higher candle power the efficiency is even greater. As will be noticed, the lamp and socket are well proportioned, graceful in outline, and highly finished in all respects. It is pleasing to notice the constant progress being made in general finish and design of the details of the prominent electric lighting systems, which a comparison of this lamp with the incandescent lamp of even two years ago so forcibly illustrates. We also show in Fig. 3 the Potential Indicator, which has been in use for some time with this system. It is very simple and accurate, registering a change of one-tenth of a volt, and does not need constant recalibration—a common fault with oltmeters.

The United States Long Distance system is meeting with marked success, having been introduced in some thirty towns in the United States during the past six months. Among these are Cambridge, Mass.; Buffalo, N. Y.; East Saginaw, Mich.; Centralia, Wis.; Durango, Col.; Portland, Ore.; Omaha, Neb.; Brazil, Ind., and Shreveport, La.

On the first of May the United States Company moves to its new offices in the new Equitable building, where it will occupy the entire third floor of the Nassau street wing. It is now placing in this building 5,000 sixteen candle power lamps, the plant to consist of a Corliss engine and seven 600 light dynamos. The company will have in its new quarters every facility for exhibiting in an interesting way its various systems. The REVIEW extends to the United States Company best wishes for increasing and well-merited success in the great field of electric lighting, which it has done so much to advance.

Will Science Discover How to Make Gold?

Report has it that the alchemists' long-looked-for discovery is at hand. A treatment of copper, tin and aluminum in an electric furnace is said to have stood the tests of acids and other means by which counterfeits are detected. The only failing is in the weight of the metal thus produced.

The ELECTRICAL REVIEW offices will be at 13 Park Row, after May 1st.

Electricity and Atmospheric Pressure.

A curious phenomenon has been observed by Mr. W. Hempel in connection with the working of a statical induction machine. It is that the quantity of electricity produced increases considerably in an atmosphere subjected to pressure. Thus a machine which would give 15 sparks per minute when revolving at a speed of 400 turns a minute, under the ordinary atmospheric pressure, could be made to give 32 sparks per minute when the pressure was doubled. If the pressure is still further increased, the quantity of electricity developed increases considerably.

Duplex Telephony.

The system invented by Mr. J. Barrett, of Brooklyn, is in use on the lines between New York and Philadelphia, and permits of four instruments being used on two wires, with the restriction that only the two extreme posts can communicate together, or the two intermediate posts, but not an extreme post at one end with an intermediate one at the other.

The new telephone cable of the American Electrical Works, of Providence, was recently tested by Mr. Geo. A. Hamilton, and showed a specific resistance of 10,000 megohms.

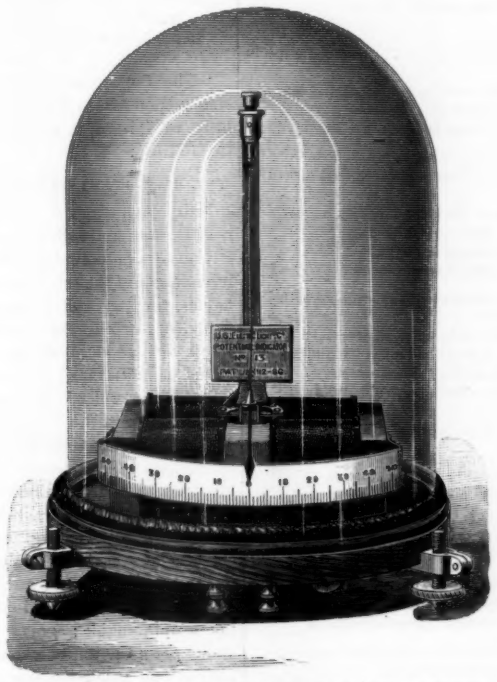

FIG. 3.—POTENTIAL INDICATOR OF THE UNITED STATES ELECTRIC LIGHT CO.

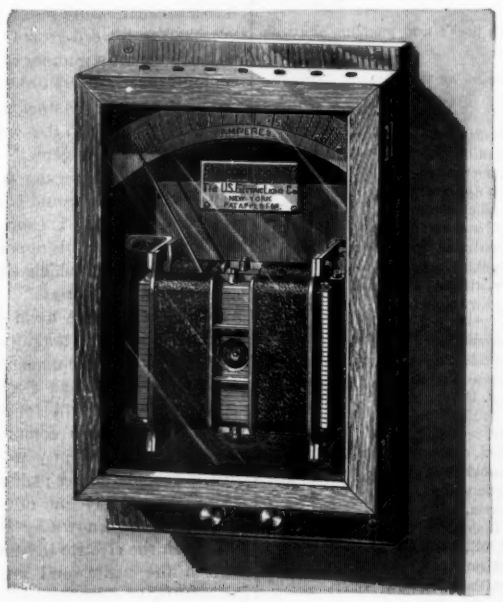

FIG. 1.—AMMETER OF THE UNITED STATES ELECTRIC LIGHT CO.

THE ELECTRIC CLUB'S ANNUAL.

A Very Enjoyable Non-Scientific Celebration by the Members.

OFFICERS ELECTED AND TOASTS.

There was in attendance at the first annual meeting of the Electric Club, Thursday afternoon and evening, April 21st, over one hundred members and a number of invited guests. The occasion was one of particular enjoyment and entertainment; technical matters for the nonce being put aside by the stalwart knights of electricity, and thought and effort centered on participating in, and listening to the informal yet carefully and happily planned programme of the evening. There were many bright things said in the responses to the toasts, all of which we give in synopsis, and the music by Lieut. Toppan and Mr. Geo. M. Phelps, Jr., most deservedly encored, as were the unique and very pleasing efforts of Marshall P. Wilder and Mr. Edward Fabian. The poem of "Electrical Nomenclature," by Mr. W. S. Hine, was most happily presented and generously applauded. Mr. Chas. Dutton, of telephone circles, acted as toast-master, and his successful handling of the programme, and cheerful way of calling out the responders, brought him scores of well-merited encomiums. The election of officers was held from 4.30 to 6.30, Mr Stephen Holbrooke and Mr. H. N. Curtis acting as tellers. There were three tickets, all agreeing mainly, a friendly contest being waged over who should serve as members of the Board of Managers and Committee on Membership. The election resulted as follows, and was announced by President Davis immediately before the dinner, and was received with applause:

President—H. C. Davis.

Vice-Presidents—Geo. W. Hebard, John B. Powell, Thomas A. Edison, Geo. L. Beetle.

Secretary—Charles W. Price.

Treasurer—Andrew J. Dam.

Board of Managers—Henry D. Stanley, M. W. Goodyear, E. T. Gilliland, Willard L Candee, Chas. Dutton, Cyrus O. Baker, Jr., H. B. Thayer, E. T. Lynch, Jr., Thomas L. Fowler, Stephen D. Field, Henry A. Reed, Fred. A. Gilbert, Geo. B. Coggeshall.

Committee on Membership—Henry Hine, Geo. Worthington, Geo. T. Manson, Henry D. Lyman, Jackson Bailey.

At 7.30 one hundred and ten seats were filled in the large dining room of the Hotel Dam, and two hours were devoted to "shunting" the good things, as a member expressed it. Mr. Dutton read letters and telegrams of regrets from the President of the Senate, Hon. John J. Ingalls; Governor Hill, of New York; Mayor Hewitt, of New York; Mayor O'Brien, of Boston; Col. Robert G. Ingersoll, Henry Hall, Geo. L. Beetle, A. V. Garratt, E. R. Weeks, John I. Sabin, and others. Mr. Sabin, who resides in San Francisco, sent to the secretary of the club a check with instructions to purchase flowers for the occasion, emblematical of youth and purity. Three magnificent bouquets, and also

boutonnieres for each of Mr. Sabin's fellow members present, were provided through this generous act. The donor's health was drank with cheers. A handsome basket of flowers was presented to Mr. Fred. Gilbert, of Boston, as the "Adonis of the Electric Club," and in response to calls for a speech he related a story, which, like the chief actor in it, "brought down" the house.

"Our Club" was ably, and with a quaint humor, responded to by Mr. C. L. Buckingham, of the Western Union Telegraph Company, who, after pleasantly alluding to the fact that he had been restricted to speaking of the past and the present in his response, plunged into mythology, science, and history, putting the words of the response into the mouths of some of his brother members of the club in a way that made the victims' hair stand on end, and amused the other listeners.

Dr. Otto A. Moses in his usual polished and entertaining manner responded to the toast "Our Future," predicting a bright career for the club with its handsome president. Response appears on page 8.

Following came "Electrical Nomenclature," by the poet of the club, which we publish in full:

"ELECTRICAL NOMENCLATURE."

BY WM. S(HAKESPEARE) HINE.

Electric clubmen, I arise
To express my great surprise
At being called on to respond here to this theme:
And it really wasn't nice
Of the genial four-eyed Price
To thrust on me this agony supreme.

For, although well-trained as most
(And I do not wish to boast),
As a second Ananias in plain prose,
It is quite another thing
To "shy one's castor in the ring"
And lie in rhyme with Jno. L. Sullivan blows!

But to plunge "in medias res"
(Note the shaking of my knees
As this ancient Latin "chestnut" leaves my lips),
I ask you to go back
On old Time's beaten track,
E'en far beyond the days of tallow dips—
Back to ancient Greece and Rome.
Searching mythologic tome
We find the cause from which our troubles flow.
'Twas the jealousy of the gods
That started them at pickling rods,
With which to beat us mortals here below.

You well recollect Prometheus'
Little scrape that raised the deuce
On high Olympus, and brought down the wrath of Jove—
How his theft of sacred fire
Brought its punishment, long and dire,
And the years he suffered unrelieved by love.

Well, 'twas but a short time later,
That, in prowling round the crater
Of Vesuvius, one brilliant summer day,
An ancient spied some amber,
As o'er the brink he sought to clamber,
And at last secured and took it safe away.

With eagerness intense
And curiosity immense
He studied it, then rubbed it just for fun,
And opened wide his eyes,
In immeasurable surprise,
At the properties he found in "Electron."

From his starry throne on high,
Jove, the Thunderer, chanced to spy
This curious old savant at his work;
Indignation, wrath and fear
Paralyzed him, then in sheer
Amaze he quickly sent for Mercury the winged messenger of his will,
Bade him summon all the band
Of deities of sea and land,
To meet at once on the Olympian hill.

Swift sped the winged-heeled messenger,
And at the summons of dread Jove, the mighty one,
Forthwith they came, with trembling haste,
Neptune and Vulcan and all the he-male throng;
Nor disregarded by the fairer ones
Was the all-powerful mandate.
Sweet Venus, rosy as the smiling morn,
Blushing divinely 'neath ambrosial locks,
The glances from those lustrous starry eyes
Piercing the cerulean dome of heaven,
Refracted thence to penetrate the hearts
Of love-sick mortals on the sleeping earth,
And fill their dreams with amorous ecstasies!

Proud Juno, smiling Hebe and Diana fair—
But why prolong the list? they all were there,
And catching up a spear of lightning strong,
Old Jupiter spoke thus unto the throng:

"Called ye I have, ye mighty ones," quoth he,
"That ye might learn what I did just now see
Transpiring on the globe of earth below:
These wretched mortals, curious and wise,
Attempt to pierce the secrets of the skies,
And, as the gods, all things divine to know.

"They fain would wrest from us our mighty powers,
And make the elements their servants like to ours,
And seek to give the widest of of publicity
To all the hidden powers of electricity.

"Shall I yield up my sovereignty of command
O'er lightnings' darts to any mortal band?
Nay—never! Let us dire vengeance wreak
On every prying Roman dog—or Greek."

Loud rang the plaudits, and each one
Had something to suggest that should be done,
When suddenly old Neptune raised a shout,
Announcing that at last he'd thought it out.

"Ye well remember how in days of yore
On yonder distant Babylonian shore,
An ancient race built up high Babel's tower
To emulate us gods in might and power,
And how we sent them reeling to the ground,
And scattered them o'er earth's wide circle round,
All shrieking with their utmost power of lungs
In several thousand strange and differing tongues.

"Let's try it on again; it worked well then,
And kept us still above the herds of men;
I've learned in sailing round in ocean's swash
A paper collar on the neck 's worth two in the wash!"

"Three cheers for Neptune!" cried old Jupe in glee,
And hugged the hoary monarch of the sea.
"Now let us tackle to this question wary,
And each of you consult your dictionary."

Then from the lips of all began to flow
Rock-shivering blasts of complex, dreadful words
That smote upon the ear as though a blow
Had fallen. E'en the birds
Of Heaven, on hovering wing,
Listened and lost all wish to sing!

Great Jove commenced the racket with "Potential,"
Accepted with a deference reverential:
Then Vulcan, with a strident voice and hoarse,
Yelled from his anvil, "Electromotive force,"
While Neptune, chuckling, said, "Now I'll be blowed:
Let's fix them with 'cathode' and 'anode.'"

Then Jupiter let fly another bolt,
And watched it as he shouted "Volt,"
While Juno, with a smile serene and glad,
In queenly accents chimed in with "Farad."

Love's throbbings in sweet Venus' snow-white breast
Suggested warm "pulsations" to the rest,
And of her eyes the gleaming phosphorescence
Induced the origin of "Incandescence."

And now, as when some army, vast and strong,
Begins to fly, and 'tis not long
Before each man in all the mighty host
Hurries and crowds that he may not be lost,
E'en so the words came crowding thick and fast,
And each more harsh and puzzling than the last.

Watt and erg and dyne and ohm,
Gauss and ampere and coulomb,
Armature and commutator,
Secondary generator,
Inductorium, insulation,
Permanent magnetization,
Pole and arc and dynamometer,
Field of force and electrometer,
Anions, ions, cell and cation,
Radiophony, almalgamation,
Agonic, isoclinic lines,
Coils and shunts, circuits and sines,
Rheotrope and galvanometer,
Polarization and rheometer,
Molecule and atomicity,
Currents and cosmical electricity,
Endosmose, osmose, diaphragm,
Electrolysis, A. J. Dam,
Amplitude and declination,
Micro-tassimeter, retardation,
Resinous, vitreous, chlorous, switch,
Phlogiston, solenoids "and sich,"
Zincode, platinode and relay,
Calorimeter, inertia,
Diamagnetism, fusion,
Resistance, equivolt, occlusion,
Dielectrics, actinism,
Foucalt, helix, crith and prism,
Nascent, tension, rheostat,
Equivalent, Leyden jar, Joulad,
Equipotential, consequent pole,
Just here they stopped—God bless my soul,
The gods themselves had e'en gone mad,
The scheme that they for others had
Contrived had done its fatal work,
Try as they might, they could not shirk
The fatal consequence; that's why
They quit the realms of earth and sky,
And sought out homes in other spheres,
Where possibly, in lapse of years,
Their scattered senses might return,
While we poor mortals fret and burn
To free ourselves from this dread curse,
While matters constantly grow worse!

For Arago and Farady,
And the great Franklin, surnamed B,
Who lured the lightning with a key,
And telegraph Morse, I mean S. B.,
And not our common friend R. E.,
And Cyrus W. F, i, e, l, d,
Who planted wires beneath the sea,
And Thomas Alva Edison, he
Who by some people 's thought to be
The inventor of electricity,
Farmer and Siemens, Weston and Gramme,
Jablochkoff, Rumkorff, and Maxim (Hiram),
Oersted, Leclanche, Daniell and Julien,
Brush, Thomson-Houston and Sawyer & Man,
Stanley and Westinghouse, Edco and Jenny,
Mather and Schuyler, I can't think of any
To add except Drawbaugh and Faure, Gray and Bell—
There's hundreds of others whom you know quite well,
Each and every inventor, both early and late,
Seems doomed, by an incomprehensible fate,
To follow serenely the deities' plan,
Of clothing each new scientific idea
In garments ungainly and ancient and queer,
Until what knocked the gods out proves fatal to man.

A remedy, gentlemen, I would propose,
That should lift from our shoulders this burden of woes,
But confess I'm unable, and merely suggest
A committee of forty to search out the best.
It should be done thoroughly—"aye, there's the rub"—
Here's labor colossal for the Electric Club.

"The Barbarians of the Outside World" was responded to by Mr. C. J. H. Woodbury, of Boston, in the following entertaining address:

THE BARBARIANS OF THE OUTSIDE WORLD.

Many years ago a tract of land situated near Boston, and called Brook Farm, was occupied by a community, who, like the ancient inhabitants of the third part of Gaul, had two names, for they called themselves transcendentalists, while the country folk round about with good intentions and bad grammar called them "transil-dentists."

This community was founded upon principles set forth in the Utopia of Sir William Moore, believing very truly that in his best estate man is in harmony with his environment; and with that end in view endeavored to place every member amid the most congenial surroundings, dividing them into groups called gangs, each containing persons of similar tastes. They were a rare band of idealists, able to soar to the infinite and dive to the unfathomable; grasp the unattainable and explain the unknowable; but they could not pay one hundred cents on the dollar, and hence the concern came to grief.

The cause of the collapse was very clearly shown in a caricature published at the time, representing a weed-grown potato field, and on the fence sat a number of members of the community, who were ordered by one of the leaders to hoe the potatoes, and they replied: "We don't belong to the working gang, we belong to the eating gang." On an occasion like this the eating gang is so delightfully organized that one would best be content by remaining in it; yet I cannot refrain from availing myself of this opportunity to allude to the importance which electrical matters bear to all other interests.

I shall not obtrude upon you the logic of figures to show the magnitude of electrical interests, because the monetary value of the property invested in an electrical plant is no measure of its worth to the community. Suspend telegraphic communication for a day, and the uncertainty would spread distrust in financial circles; silence the fire alarm for a night and any one of our combustible cities might be known by its ashes alone; extinguish the electric light while the sun is beneath the nadir, and crime would riot. But why carry the comparison further, when we know that electricity is essential to the more active conditions of life, giving the daily press its fulcrum to move the world, producing the rapid conduct of business—a guide in traveling and a guardian at night; wherever we may be, whatever our circumstances, we are subject to a dependence upon some application of electricity.

And this has come to pass within so few years, that it is doubtful whether any man present over thirty years old selected any application of electricity, with the exception of the telegraph, as a means of livelihood, in the sense that a youth would select a trade or commercial or professional avocation. The business of electricity reminds one of the ready-made clothing dealer, who, when his rival across the way raised a new sign "Established 1804," immediately added to his own sign "Established yesterday, no old goods on hand."

Wide-spread as are the uses of electricity, have we not good reason to expect its wider application in other directions, especially in industrial chemistry, where its present use is almost limited to electro-plating, and the single instance of electro-metallurgy in the production of aluminum alloys? The only application of static electricity to the arts languishes under the injunction of a United States Circuit Court; but a suggestion for an application of static electricity was once made by two laborers from a saw-mill while trudging home through the woods in a thunder storm, wet without, and doubtless dry within. The lightning struck a tree near by, rifting it to splinters; one said to his companion, "Wouldn't the lightning make a fine saw-mill?" "So it would," he replied; "but who short of the divil could tend the biler?"

There have been other instances where those in proximity to electrical phenomena have not fared so well, as regards physical harm, or in the quickening of the intellect which occurred in this case. In the basement of a certain factory lighted by electric arc lights there were two Italian laborers; the one who had been there the longer was explaining to the new comer all about the electric light, chattering from the end of his tongue, probably telling him what electricity was, and giving him other information of importance, which the lack of an interpreter has lost to the world, and prevents me from repeating. Evidently with a view of explaining the manner of placing the under carbon, he suddenly reached his finger into the hole in the bottom of the lamp. There was sufficient ground on the circuit to shunt enough current through his body to render him as rigid as the Statue of Liberty, and fix him in much the same position. This may have antagonized the national sense of the artistic and beautiful in his companion, who tried to pull him away from his pose, and he in turn received enough of the shunt to fix him with encircling arms; thus for once have we seen in this country, in the land of the free, an example of "United Italy." Some one switched the lamp out of circuit, and the men fell down with fright. The person in charge of the lights, thinking that this was an opportunity to present a terrible example of the effects of handling the electric light wires, immediately poured over them some stagnant water from the pails labeled "For Fire Only," and as the men survived that, the hose from a hydrant was turned upon them; but before the drowning process was quite complete, or the "surprise party" of an involuntary bath had proved fatal, they were allowed to go home, with orders to remain in for the rest of the day, and with a very good chance of surviving. Since that time the well-written notices of the superintendent, forbidding any meddling with the wires, have been entirely redundant and unnecessary.

It may be a heresy for me to state before an audience like this that electricity can be anything but a blessing; but it is a fact that electricity is the great difficulty in the way of textile manufacturing. The person who will invent some method of ridding the process of textile manufacturing from the difficulties arising from static electricity upon the fibers will do more for this great and important class of industries than has been accomplished by any one since the days of Arkwright. These difficulties are not entirely of a commercial nature, but sometimes reach an unexpected personal annoyance, as occurred when the treasurer of a certain cotton mill called at the establishment to see a new engine which had been added to the service during his absence.

The manager, who was supervising re-

pairs around the water wheels, left his work, and still wearing a pair of rubber boots, escorted the treasurer to the engine room. While standing under the main belt he became heavily charged; and all unconscious of his condition touched the treasurer to call attention to some matter and gave him a shock which will be remembered during the rest of his natural life. The manager, on the other hand, will never forget the expression of pain and perplexity on the face of his superior officer, who turned suddenly around, wondering as to the cause of the injury and the motive which could have induced his agent to inflict it.

All the numerous applications of electricity are evolutions from simple inventions which have been developed into systems. Men of business insight, with no knowledge of electrical or mechanical principles, have accomplished a great deal by directing the work of inventors into proper channels in advance of the general demand for such work. Most of this work of fitting each and every detail of any electrical system for practical and commercial use has been performed by skillful artisans, whose handicraft and good sense made the means reach the desired end. The Morse telegraph, with its useless system of underground wires, would be remembered only as a fruitless experiment if some laborers, unknown to fame, had not placed the wires on poles over the stone bridge at Relay station because they could not bury them there; and when the first seven miles of the line proved inoperative, the buried wires were replaced by aerial wires.

No small measure of the success of the telephone has been due to the minor inventions added to every part of the system by those who never would have thought of the matter had not their minds been quickened by the necessities following the inventions of Prof. Bell.

The success of the work of every electric lighting system, bearing the name of the inventor, has been possible only by the added inventions, given by scores of bright minds, meeting and conquering the legion of difficulties of detail which stood in the way of the desired results.

It may not be generally remembered, but there is a record of an attempt at the electrical transmission of speech made and abandoned in thirty seconds, in Missouri, over twenty years ago. The account was published in *Harper's Magazine* for June, 1867, page 131; and it was doubtless read with approval by one hundred thousand persons, yet none of them, as far as known, ever made any attempt to accomplish the electrical transmission of speech.

The incident happened some two years before its publication, and related to the destruction of the telegraph office at Jefferson City by the raid of Gen. Price during the latter part of the war. Telegraph instruments were temporarily placed in a carpenter's shop, and during the absence of the operator the instruments began a terrible clicking, which the carpenter interpreted as of special importance. Thinking that something must be done, he bent over, and taking the ground wire between his teeth shouted, "Operator 's gone to dinner; be back in half an hour!' and connecting some portions of the apparatus with his lips, he received a shock in the mouth that stopped his further attempts at the transmission of speech.

At the risk of being recommended to try the remedy, I will venture to relate how electricity induced Rev. Dr. Bogus to preach short sermons. A person of electrical proclivities was very much troubled by boys with roguish tendencies pulling his door bell evenings, and as a remedy he arranged battery, coil, and connections, so that anyone ringing the door bell would receive a sufficiently severe shock to contract the muscles of the arm. After nightfall the connections were made and developments awaited for. Soon a boy came along whistling merrily, and reaching up, grasped the bell pull, and, terrified to feel the strange twinges in his arms and unable to let go of the bell pull, he screamed with fright.

The circuit was switched open, the boy lectured, discharged, and the trap set again.

In a few minutes there were loud cries in a deep bass voice, and opening the door he was amazed to see his pastor, Rev. Dr. Bogus, grasping the bell pull, his arm bent so that the shoulder nearly touched the hand; while Mrs. Bogus, who was with him, was saying: "Why, Martin Luther Bogus, how you act! What is the matter with you?"

"It must be paralysis. May I have grace to bear this terrible blow."

Now, if our friend had not been a man of rare presence of mind, he would have switched open the circuit, let the parson go, and receive the pains and penalties of exposure. His expressions of surprise and sympathy were well stated, while he rubbed

FIG. 2.—NEW STRAIGHT FILAMENT LAMP OF THE UNITED STATES ELECTRIC LIGHT CO.

the arm of the Doctor with one hand, and with the other reached into the vestibule and gradually withdrew the iron core from the coil; and, as a consequence, the sensations in the Doctor's arm diminished accordingly, and as is usual with persons under medical treatment, the visible methods employed received all the credit of the result.

When the Doctor was able to remove his grasp from the bell pull, he went into the house, and submitted his arm to more rubbing, while his host informed him in an authoritative manner that his difficulty was not paralysis, but a peculiarly aggravated case of scrivner's palsy, caused by excessive use of the pen; "and now let me beg of you, Doctor, have some consideration of your own self, and not merely of your congregation, and do not write such long sermons!"

The Doctor made and kept his promise, and in limiting his sermons to fifteen minutes, his congregation has grown, and opportunity of doing good in like manner increased.

Mr. H. J. W. Dam, of the New York *Times*, appeared in the guise of one of the "barbarians," and in a very humorous way criticised the weird language of electricians, gave his own terrible experience with an undomesticated "thermopile," and concluded an address that sparkled with wit in every sentence, with the request that the electrical language be changed to common English, lest this unknown tongue so grow on its victims that they become strangers and wanderers unable to make known their wishes in civilized communities.

A formal account of the proceedings give but a poor idea of the enjoyable, sociable evening. The side-splitting stories of Mr. Wilder, the splendid recitations of Mr. Fabian, the solo of "The Mariner," beautifully rendered by Lieut. Toppan; the singing of the entire assembly, with Mr. Phelps most skillfully presiding at the piano, the music of the club's orchestra, were some of the features interspersed with the toasts leading up to the sparkling final one on the programme. "Our Guests" was proposed, and was responded to by Commodore C. A. Cheever, who in a few felicitous words expressed his gratitude for the privilege of being present, and his intention of being on the first list of new members; and by Hon. Robt. McCarthy, of Syracuse, whose prediction, after thanking the club and his host for the pleasure he had experienced, that the time was not far distant when the same element that would announce a traveler's departure from England's shore, passing through the cable, beneath the waves, would also be the power that would propel him across above the water, was received with applause. The programme is published in full below, and the "Informal Proceedings" were not the least of the entertainment. Before adjourning the entire assembly united in singing "Auld Lang Syne," with a heartiness characteristic of the fraternity, and then devoted an hour or more to becoming more thoroughly acquainted.

THE ATTENDANTS.

The resident members of the club were present in full force and a number of the non-resident members came in from Boston, Philadelphia, Pittsburgh and other points. Among those present were H. C. Adams, C. H. Barney, C. L. Buckingham, C. O. Baker, Jr., H. N. Curtis, W. M. Callender, Geo. B. Coggeshall, L. E. Curtis, W. L. Candee, H. J. W. Dam, A. J. Dam, Chas. Dutton, Commodore C. A. Cheever, D. E. Drake, H. C. Davis, M. T. Davidson, S. D. Field, Gen. E. S. Greeley, M. W. Goodyear, Capt. H. R. Garden, Geo. W. Hebard, Henry Hine, W. S. Hine, Ph. F. Kobbe, E. T. Lynch, Jr., Mr. Strong, H. D. Lyman, Horace B. Miller, Dr. Otto A. Moses, Geo. T. Manson, B. B. Nostrand, Jr., Commodore Roosevelt Schuyler, H. L. Lufkin, J. N. Pratt, C. F. Parmelee, E. F. Peck, Jno. B. Powell, Geo. M. Phelps, Jr., Frank L. Pope, C. W. Price, Marshall P. Wilder, H. W. Pope, J. M. Pendleton, E. R. Wiggin, H. A. Reed, A. F. Stanley, C. R. Truex, T. P. Conant, Albert Taylor, Lieut. F. W. Toppan, U. S. N., Edward Fabian, H. B. Thayer, Angus Hibbard, L. N. Downs, T. L. Fowler, Frank G. Stone, Geo. Worthington, W. D. Sargent, J. C. Reilley, A. C. Fowler and brother, Geo. Prescott, Jr., E. B. Chalmers, of New York city and immediate vicinity; H. D. Stanley, E. S. Hayden, H. L. Bancroft and T. B. Doolittle, of Bridgeport; F. W. Harrington, Fred A. Gilbert, C. J. H. Woodbury, M. M. M. Slattery, A. F. Mason, A. F. Upton, Boston; James English, E. A Colby, New Haven; Stephen Holbrooke, Geo. F. Porter, A. J. DeCamp, S B. Richards, J. M. Matthews, W. E. Sharps, W. B. Buchanan, M. M. Garver, of Philadelphia; H. M. Linnell, Hartford; Jack Selden, of Mattawan, N. Y., H. W. Spang, of Reading; Zack La-thaw, of Pittsburgh; F. A. Cheney, Norman McCarty, Capt. P. Michaelis, U. S. A., of Troy; Hon. Robt. McCarthy, of Syracuse; H. R. Rhoads, of Williamsport, Pa.; J. N. Casnova, of Phillipsburg, Pa.

PROGRAMME OF TOASTS.

"OUR CLUB,"
Response by Mr. C. L. Buckingham.

"OUR FUTURE,"
Response by Dr. Otto A. Moses.

"THE BARBARIANS OF THE OUTSIDE WORLD,"
Response by Mr. C. J. H. Woodbury.

"GENTLE PROTEST FROM THE BARBARIANS,"
Response by Mr. H. J. W. Dam.

"ELECTRICAL NOMENCLATURE"—A RHYME,
By Mr. Wm. S. Hine.

MUSIC,
By Lieut. F. W. Toppan, U. S. N., and Mr. Geo. M. Phelps, Jr.

INFORMAL PROCEEDINGS.

ANNOUNCEMENT.
Next Regular Monthly Meeting, May 19th, at 6 P. M.

⁂ The hearing in the case of William McMahon, of Rahway, N. J., against Maurice B. Flynn and the subway companies for breach of contract is still in progress in the United States Circuit Court before United States Commissioner Shields. John R. Burdick, of Brooklyn, general manager of the American Insulated Conduit Company, testified that he was engaged with D. H. Dorsett in Chicago; is at present his partner. Some of the patents on the system are in his name. He defined the Dorsett system as the one in operation in Chicago and Detroit; it has been built in Brooklyn and in this city. Subscribers to the stock were H. S. Busby, Fanning, Jarvis, Spencer, Weeks, Dorsett, and the witness. The first money on the stock was paid last September. It amounted to about $50,000.

—— A meeting of the directors of the new corporation known as the Utica Electric and Gas Company, of Utica, N. Y., was held Saturday, and the following officers elected: President, W. J. Bacon; vice-president, E. A. Graham; treasurer and general manager, W. P. Fish; secretary, T. N. Mooney.

ELECTRICAL REVIEW

Published at 23 Park Row.
P. O. BOX 3329.

GEO. WORTHINGTON, - - - Editor
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ANDREW J. DAM, - Vice-Pres't and Treas.
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SUBSCRIPTION.
United States and Canada, $3.00 per annum, in advance. Postage paid by publisher.
Great Britain and other foreign countries, $4.00, in advance. Postage paid by publisher.

ADVERTISING.
Transient, 25 cents per line, nonpareil.

DEALERS SUPPLIED BY
The Albany News Company, Albany, N. Y.
The American News Company, New York, N. Y.
The Baltimore News Company, Baltimore, Md.
The Brooklyn News Company, Brooklyn, N. Y.
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EDITORIAL ANNOUNCEMENT.
Address all communications and make all Express Money orders, P. O. orders and checks, payable to order of ELECTRICAL REVIEW, P. O. Box 3329, New York.

NEW YORK, APRIL 30, 1887.

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We question if the local arc light companies realize how large a percentage of their earnings is dissipated through unsatisfactory service due to imperfect carbons. The combination which has just gone into effect has raised prices and will unquestionably improve the quality as well. Where 10 per cent. of operating expenses were charged to carbons, now 20 per cent. will be nearer the truth. Unsatisfactory service two days only in a month necessitates rebate on bill sufficient to pay for the increase in the cost of the carbons. Many stations by slight changes in equipment can save enough in the cost of producing power to offset the increased expense of first-class carbons.

REMOVAL ANNOUNCEMENT.

The ELECTRICAL REVIEW, having outgrown its present quarters, will on May 1st, move into the elegantly finished building at 13 Park Row, and will occupy the entire second floor. This is one of the best locations in the city, directly opposite the Astor House, and fronting on Broadway. The building is lighted throughout with the incandescent light—Edison system—and is newly fitted up with every convenience.

The New York *Mail and Express*, with the wisdom to be expected from its able editors, remarks that "The ELECTRICAL REVIEW covers a wide field, and is a success."

The Electric Cub's first annual meeting was a decided success. The interest and enthusiasm displayed greatly surprised those present for the first time. The next regular club meeting will be held Thursday evening, May 19th, at six o'clock.

The Vitrite and Luminoid Company has removed to 182 Fulton street, corner Church. Mr. Theo. Mace, manager of this company, recently returned from Europe, where he had spent several months looking after the interests of his company.

An insurance inspector of electric light plants was questioned in regard to the improvements in installations. He said, "During the past year no plants have been set up by established companies that have not been first-class in every particular. Where a man of small experience takes a contract, buys his dynamo of one concern, his lamps of another, etc., we sometimes have to visit the place a second time before everything is fixed properly. The companies are always glad to comply with our suggestions."

The addition of storage batteries to electric light plants has, in some instances, resulted in no increased expense for current to operate lamps during the hours the machinery is not in operation. A 500 light isolated plant is in operation 10 hours in the day time, during a part of which time, and also during the remainder of the day and night, twenty to forty lamps are in use. The batteries are charged during the working hours and supply the lamps the remaining time. With a very small load of lamps the engine cannot work economically, and a slightly increased expenditure of steam enables it to work at the most economical point of cut-off. If there be a small load of lamps, the batteries receive current, the load increasing, the batteries supply a portion of the current and the engine never supplies the full load of lamps direct. Enough may be saved in working the engine always within a profitable range of cut-off to furnish the batteries with sufficient current to run a moderate number of lamps during the night.

The increase of price in carbons due to the combination has brought to the surface a number of devices for giving longer life. In some cases the mixture is composite, carbon and varying percentages of infusible materials. If this can be done without materially increasing the resistance of the carbons a great advance will be made. The only experiments on record were made some years ago. The substances incorporated in the carbon were of a low volatilizing point, compounds of sodium and potassium. Magnesia gives good results when used in small proportion with gas carbon. All foreign substances in some degree affect the color of the light; if the mixture be not perfect the change from white to blue and then to red, etc., is more disagreeable than flickering. Gas carbon is nearly pure. The improvements in arc lights during the two past years is largely due to the use of carbons made from petroleum coke, a material free from silica, magnesia, lime and iron. It is therefore questionable if the addition of any of these or others will improve the steadiness of the light, however much the candle power may be increased.

PUBLISH THE RESEARCHES.

Physical laboratories are springing up in every direction, professorships are endowed, apparatus manufactured or purchased, and students are working in the line of original investigation. The results of their work are regularly published in the scientific journals; and, to prevent unnecessary duplication of work, short papers are published from time to time, stating what subjects are under investigation. There are none too many workers in this field; and rediscovery may be interesting, but it involves a useless loss of valuable effort. Within the last ten years, a large amount of original work has been done by practical men in the interest of electrical companies, but very little has been published. That this class of investigators do not receive due recognition at the hands of the scientific world is largely due to this fact. Excepting all trade secrets discovered from time to time and carefully guarded, much that is of interest from a purely scientific point of view could be published, the cause of science advanced, and due credit given to the discoverer. It is all very well to laugh at he laboratories as describing phenomena, deducing principles long ago known to practical workers; but how is the world to receive the benefit unless they are published? A laboratory of a college is fortunately situated, if it possesses two or three original investigators and a small equipment of apparatus. The experimental room of a factory often has a dozen or more trained assistants, and a ready supply of material and equipment. What wonder is it, then, that the latter take the lead in investigation? Only let the world have the benefit of the results.

GAS AND ELECTRICITY.

Some one once said, "If you desire to have something done, you must offer an inducement." The maxim is thoroughly correct, perfectly true. If it is possible to offer a method, a system of production, a manufactured article, at an advantage to the party whom it is desired shall become interested, the method, the system, or the article may be readily disposed of.

On the other hand, to assume virtues or excellencies which are not possessed by the process or thing offered, the incentive to purchase is wanting; and if perchance a purchaser is found, no very extended time is required for a thorough comprehension of the cheat, and the amount of money gained to the salesman is hardly a balance for the loss of reputation which inevitably follows in the trail of that form of sharp bargaining.

In the earlier days of new enterprises there are always many of these "snaps," which confront the public, and harass it. Every conceivable thing in its line for which it may be possible to obtain money, comes to the surface, while the public is in the transition state between thorough ignorance and a little knowledge of the principles involved; and the "snap" dealers reap a short harvest from a deluded constituency.

In electricity this disposition to gull the public rode the crest of the billows early in the action; and whether it was a new form of one or another kind of machine, or instrument, or some original and valuable discovery by which electricity could be inhaled or magnetism could be taken into the stomach, there were plenty of gulls on the wing to swallow all such baits, and pay the penalty.

But when a truly meritorious improvement on some ancient and honorable system of production, or some new and more economical mode of manufacture makes its appearance, there is ever a conservative army, which, feeling that the new is possibly crowding upon the reserve domain of the old, decries the fledgeling, and belittles it with all the power and ability which long life and business acumen has taught these professional regulars.

The army of gas manufacturers of the world held aloof from the electric light, in the onset (possibly from want of knowledge) and said hard things of the new system and its advocates. The regulars warned the people of the danger which lurked behind the dazzling beacon, "the bright eye of the serpent which crouches to strike a deadly blow," on the slightest provocation. They have held away until their grip is loosening upon lighting enterprises, till at last they have thrown up the sponge; and wherever their charters and State laws will permit, or these can be made to allow it, they are joining the two methods of illumination under one roof.

So that while heretofore the electric lights were from their standpoint, terrible, dangerous affairs, these (or they) have come suddenly to the about face, and now, nearly every gas corporation has discovered that it is a good thing to supply both species of illumination from the same works. At the recent meeting of the Ohio Gas Light Association at Dayton, the editor of *Light, Heat and Power*, in an able paper on gas and electricity, after a very generous and commendatory resumé of the life history of electric lighting, advocates the union of the two interests succinctly because:

Nearly every city or town of 10,000 inhabitants has an established gas plant, with a complete organization, executive management and labor systems in active, harmonious operation. "Generally such companies have a surplus of brain and sinew, not taxed to its full capacity to manage the company or operate its works," and in many cases could operate an electric light plant with little or no extra expense for executive or manual labor.

The companies have, generally, sufficient land for the additional plant—rent would thus be saved. Coke, where this is a drug, could be utilized, while, where this now meets ready sale, better prices could be obtained because of the additional facilities for disposing of it.

Most of the older gas companies have money sufficient to pay spot cash for a plant, and thus be enabled to underbid an electric light company on lighting contracts.

The gas company would be enabled to light the streets with arc lights, running wires at much less cost than would be required for gas pipes to distant portions of the city or town, and this in turn would force up the illumination of residences and business houses, and drive out oil and candles in favor of gas. Finally the gentleman asks: "Is it wise for the gas companies to leave its use, for good or ill, in the hands of those who have no interests in common with us? Is it not better that we should take it into hand as an acknowledged ally and friend? It may be said that the gas companies in one State in the country have determined the ethics of this matter for themselves, and their example is worthy of imitation. Shall it be followed?"

The electric light people owe much of this victory, which almost completely annihilates their most formidable enemy, and opens up the way to more rapid marches than heretofore, to the National Electric Light Association and its thorough canvassing of the subject of electric lighting; to the intelligent methods of discussion, and to the general manliness and uprightness of all its proceedings. The returns, in a monetary sense, which have been paid back to its members through a more rapid increase in business have been many fold what they would have footed up otherwise. While the information, both theoretical and practical, which has been disseminated at the various meetings of the association, are valuable beyond price or calculation.

Don't Expect Too Much from the Primary Battery.

"The public do not always give primary batteries a fair show," said an inventor; "they first ask for something that will light a five or ten candle lamp. When you bring out cells that will do this successfully, they say there is too much bulk and weight, and ask for something light and handy."

"That reminds me of something I heard up in the Farmers Club in Boston last week," said an electrician, devoted to fancy farming. "An Essex farmer, who would make a worthy pupil of the Concord School of Philosophy, asked if it would not be possible to so concentrate fertilizers that enough for an acre could be carried around in one's pocket. An old farmer rose and drawled, 'Yes, I think you might, and carry off the crop in the other pocket.'"

OUR CHICAGO LETTER.

(From a Special Correspondent of the ELECTRICAL REVIEW.)

Politics have done much to employ the minds of all Chicago people for the past month. The outgoing mayor has held the fort for four consecutive terms of two years each, but refused to make the race for the fifth. The new incumbent being a decided Republican, of course there was a large expectant crowd ready to accept places under the changed administration. The contest, however, could hardly be considered a political one, inasmuch as the regular Democrats had no ticket, and the race lay between the conglomerate elements — socialists, anarchists, communists, *et al.*—on the one side and decency on the other.

Mayor Roche is acting a very conservative and judicious part in making changes.

On the 21st, among other delegations to the City Hall, was one composed of several members of the Fire Underwriters' Association, which proffered but one request : that the present Fire Chief, Marshal Swenie, be retained at the head of the Fire Department. Mr. Drew, an ex-alderman, stated that the association were a unit on this point, utterly regardless of politics in any form.

The Mayor is quoted as having replied that he had no intention of disturbing Chief Swenie; in fact, that he would be retained.

This action will leave the Electrical Department of the city in the hands of the present efficient Superintendent, Prof. J. P. Barrett, who this month finishes his eleventh year in charge of the electrical portion of the corporation machinery.

At Nevada, Mo., the capital of Vernon county, a correspondent states that during a severe rain at two in the morning, balls of what seemed to be fire fell at an angle of about 45 degrees. Striking the ground these burst into myriads of fiery flakes, rebounded several hundred feet toward the east and died away. The exhibition continued for several minutes.

"Lightning and smoke in the air" were succeeded by a copious rainfall at California, Mo.

It may be proper to remark, if the facetiously inclined dude can be persuaded to let the chestnut gag rest, that winter is still nestling in the lap of sweet young spring—and, confound the giddy girl ! she seems rather to enjoy it.

The Chicago Telephone Company will very shortly commence the erection of a seven story office and operating building, 40x90 feet, of pressed brick and stone, at the northeast corner of Franklin and Washington streets. All the company's auxiliaries, repair and store rooms, as well as offices of company, will be removed to the new structure, which is to cost in the neighborhood of $75,000.

Almost across the street, south of the new building, is located what will be largest electric light plant in the city. When this latter is completed lines will run from that central station through or across nearly every street on the south side, north of Van Buren street, and as the telephone lines do the same thing, and all will be nestling side by side in the conduits, in the very near future, it is perhaps admissible to give one moment to the thought—that idea you know—the what-you-may-call-it—when the lion and the lamb shall lie down together, and quit growling at each other.

The annual vexation in the way of the store awning and its fixtures has sprouted and is ripening in the southern exposures of our streets. The electric light man is having considerable conversational amusement in consequence. It is to him what sassafrass or sulphur and molasses is to the average granger in the spring time. The result has been an order among several of our central plant employes that compels a walking delegate, so to speak, to go over the entire line every day, on a search for that kind of interloper and kindred parasitic growths of the early season.

Chicago, April 25, 1887.

OUR BOSTON LETTER.

(From a special correspondent of the ELECTRICAL REVIEW.)

The State of Maine is nobly keeping to its motto, and leading in the enterprise of its citizens in electric lighting. No town appears too small to consider the subject of the modern illuminant. In one part the incandescent light is so cheap that no farmer would think of running the risk of fire by using an oil lamp while milking the cows. Some plants are operated by water power, of which the State has an abundance. The town of Dexter, Me., is now provided with a 450 incandescent Brush-Swan plant.

The Schuyler Company has given such satisfaction at Westfield, Mass., that the number of street lights is to be increased, and the entire city within a radius of half a mile from Elm and Arnold streets will have arc lights. The amount appropriated for this purpose is $5,000.

The gas companies are not likely to have plain sailing in many directions this year. Before the State Committee on Manufactures there appeared W. E. L. Dillaway, of the Bay State Gas Company, asking that the law be so amended that no gas light company shall manufacture gas containing more than 3 per cent. of carbonic oxide. He said his company owned a process by which water-gas could be made with less than 3 per cent. carbonic oxide. Of course, the gas companies appeared as remonstrants. Some years ago, with a view of preventing competition from companies manufacturing water-gas, which contains over 30 per cent. of deadly gas carbonic oxide, they had a law passed by the Legislature prohibiting the manufacture of gas for illuminating purposes containing more than 10 per cent. of this gas. Coal-gas contains from 4 to 7 per cent. Those interested in water-gas processes tried last year to have the law changed. They were unsuccessful. The coal-gas companies brought proofs of the dangerous character of water-gas, and then put in auxiliary water-gas plants, mixing the product with coal-gas, still keeping the percentage of carbonic oxide below the amount prescribed by law. It was "Heads I win; tails you lose." The product to be manufactured by the Bay State Gas Company will be much less dangerous than that at present in use, and the bill deserves careful consideration.

December 31, 1881, the Boston Board of Aldermen granted to W. R. Clark and others rights and privileges to lay and maintain pipes and conduits and to conduct wires underground in certain streets An order has now been passed authorizing the American Conduit and Conductor Company all the rights and privileges granted to the above mentioned persons. There seems to be a general impression that the order will be vetoed by the mayor.

There are rumors that a new electric light company is to build a station and furnish arc and incandescent light in the city; just what system is to be used is not stated. At the present time a plant is installed for less than one-half the expense three years ago. The conditions of commercial and profitable supply are well known, and with good management arc lights of the best quality can be supplied at low rates.

Within the past six months several Massachussetts towns have considered the advisability of operating electric light plants. It seems that a town can realize enough from commercial lights to pay all operating expenses. The street lighting, therefore, costs little or nothing. There seems to be no good reason why cities and towns should not supply electric light for their own use, and for general distribution as well as gas. It was found that authority from the Legislature was required and the question was dropped, as local companies are forming to supply electric light and power.

There is something more than a possibility that the supplementary electric light bill prohibiting, in section 3, any company from taking up the business of electric lighting in towns or cities where there is already such a company until permission is granted by the gas commissioners after a public hearing will be passed. If this becomes a law, the gas companies will be compelled to purchase existing electric light plants, or give up hope of engaging in that business. Steps have been taken to begin before this bill passes, the erection of an electric light station in every city and town in Massachusetts not now supplied with an electric light plant, if there be a gas company or any possibility of one being formed in that place.

The "horse" railroad companies in Massachussetts were chartered as street railway companies, no reservation being made as to the motive power. At the time of the formation of the earlier corporations, electricity was not expected to accomplish very much, but many hoped that some form of steam locomotive would be brought out. To remove any doubts, a bill has been presented to the Legislature, granting the right for any railroad company to operate its trains and cars by electricity, using any system approved by the Board of Railroad Commissioners. Rights to place poles for overhead wire systems may be granted by the authorities of respective cities and towns.

BOSTON, MASS., April 26.

A New Method of Printing by Electricity.

The object to be copied—a medal, a seal, or any other engraved or stamped object—is covered with a thin coating of graphite, and is connected to one electrode of a statical machine. The object is then placed, with the prepared side downwards, on a piece of cardboard, wood, silk, or other material on which the image is to be reproduced, and underneath which is a sheet of glass, or other dielectric, laid above a metal plate or a sheet of tinfoil, in connection with the second electrode of the machine. On working the machine, the graphite is carried from the prepared object on to the lower surface, and an exact reproduction of the design is formed. Whatever may be the method of engraving, in relief or intaglio, the image is always formed by the reproduction of the hollow lines, and not by the lines in relief; moreover, it is quite immaterial whether the positive or negative electrode is connected to the object to be copied. This is in contradiction to the generally received opinion that the mechanical transference by the electric discharge is always in the direction from the positive to the negative electrode. It is even possible to copy a chalk drawing by this process: On the top of the metal plate, in connection with the one electrode, is placed a sheet of glass, on this a sheet of clean paper, then the drawing, face downwards, and, finally, another metal plate, in connection with the other electrode. After five or six discharges, enough chalk was carried over to reproduce the drawing, while the original seemed as bright as ever.

Several theories have been advanced in explanation of this method of printing in a condenser, as it may be described; probably that of Mr. de Meritens is the true one. He thinks that the phenomenon may be explained by the ordinary laws of electrostatics. During the charging of the condenser, all parts of the object are naturally at the same potential, but the electrostatic charge is greatest at the level of those parts which are farthest from the dielectric. Consequently at the instant of discharging, the graphite is projected more violently on to those points which correspond to the hollow of the original object.

Queries and Answers.

To the Editor of Electrical Review :

Will large joints and numerous well-made joints add any resistance to a line ?

INSPECTOR,
Macon, Ga., Exchange.

ANSWER.—The resistance of a well-made joint is small at first. If exposed to the weather the contacts in time become oxydized and the resistance may become enormous. A soldered joint is not open to this objection, and the larger it is the less will be the resistance.

Porous Pots for Primary Batteries.

To the Ed tor of Electrical Review :

In his admirable paper entitled, "Some Experiments on Secondary Cells," published in the April 16th issue of ELECTRICAL REVIEW, Mr. Swinburne thinks it very strange that "sufferers from the primary battery disease" have never thought of making porous pots for primary batteries from biscuit impregnated with carbon deposited from hydrocarbons by heat.

This statement goes to show that our friends from over the water are not aware how very sick some of the sufferers above alluded to have been here in the States, and how many remedies we have tried—among which may be found some proprietary medicines, and perhaps a few which were not of domestic manufacture.

The expedient of making porous pots of biscuit or unglazed earthenware, impregnated with carbon, was one that looked hopeful.

The writer has experimented somewhat in that direction, but will not here describe the experiments, which were necessarily complicated, for the reason that they proved to be entire failures. Many different kinds of clay were used, and they were manipulated in the various ways familiar to potters. The plan was also tried of baking the various kinds of carbon to be obtained commercially, with clay of various kinds, manipulated in various ways. The result was the ruin of several kilns full of valuable pottery, because of carbonaceous gases, and a large and varied assortment of worthless porous pots.

The object of this experimenting was not, as suggested by Mr. Swinburne, to afford a passage of low electrical resistance between electrodes separated by the porous pot, but to make the porous pot itself the negative electrode of the cell. And the object of so doing may be found in the following experiment.

If we fill a new porous pot with any of the chromic battery fluids now in use, and stand it in a clean glass jar filled with dilute sulphuric acid, the chromic solution will be seen to force its way through and hang in a film on the outer side of the porous pot. Now if we place in the glass jar a strip of bright zinc and in the porous pot a piece of carbon, and connect them with a wire, the red film will show, by turning green, that it is giving up oxygen, and will begin to slip down the surface of the porous pot to the bottom of the glass jar, and fresh chromic solution will come through to take its place.

It is now obvious that if the outer surface of the porous pot was carbon, forming the negative electrode, and in good contact with the positive pole, we should have a cell of very low internal resistance.

It is a popular but mistaken notion that the depolarizer absorbs hydrogen at the surface of the negative electrode. This action takes place (supposing, of course, the cell is in good working condition) at the surface of the porous pot. If the cathions get much further than that, the cell begins to show signs of polarization.

The question of getting the negative electrode as near as possible to the point where the cathions are oxidized, without interfering with a constant, fresh supply of the depolarizing or oxidizing substance, is one of the most hopeful and also one of the most discouraging problems in connection with the making of powerful primary batteries.

It is often said, when reciting the properties which a theoretically perfect dynamo should have, that unfortunately they are not capable of being introduced into the same machine. For example, the armature should have the greatest length of wire upon its coils; the wire of the armature should be as thick as possible, so as to offer little resistance. Now these two properties are no more incompatible than some points in primary battery construction; as, for example, the attempt to place the negative electrode where it will work to the best advantage, without interfering with the proper supply of the depolarizing agent.

A perusal of some old patents will show that not an inconsiderable amount of ingenuity has been expended in this direction.

So far, all attempts to make porous pots partly or wholly of carbon have failed to give results that would warrant their use.

ALLAN V. GARRATT.

Boston, April 16th, 1887.

Telephonic News

One of the Flow-ers that does not Bloom.

Flow, electricity, flow!
Round the whole earth must thou go;
Giving to each one a sense of thy power,
Thrilling us through every minute, every hour!
Flow, electricity, flow!

Flow, electricity, flow!
How little of thee do we know;
Tell us what art thou—what thou canst do,
How thy quick way thou makest the cold iron through,
Flow, electricity, flow!

Flow, electricity flow!
Where does thy surplus force go?
Or dost thou increase as occasion demands,
Flowing unceasingly over all lands?
Flow, electricity, flow!

SPUR.

*** The Boston District Telegraph Company has elected the following officers: President, Francis W. Carpenter; vice-president, W. F. Chester; secretary and treasurer, Horatio A. Hunt.

*** Daniel Monahan, one of the linemen of the Westchester Telephone Company, was arranging a wire on the cross-arm of a pole at Tarrytown when he slipped and fell headlong to the ground, a distance of twenty-five feet. His skull was fractured and he sustained severe internal injuries.

*** The April issue of the list of subscribers of the Sunset-Telephone-Telegraph Company, San Francisco, has been received. It contains 110 pages, without a single advertisement, a list of all business houses, carefully classified, and presents every detail of advantage to the subscribers. Such telephone lists are of particular value to the hurried subscribers, and we hope to see them become more and more numerous in the telephone field.

*** "It's strange," exclaimed an old business man, "how the same things are reinvented again and again. I just had a man in this office who applied for a patent on a method of signaling by electricity from the pipeman to the engineer of a steam fire engine. He had a reference to a patent which I own and had taken out a number of years ago. The method was tested and found to be very useful. The man holding the pipe can signal for aid if he finds himself becomming overpowered by the fire or smoke, and much time saved in communicating."

*** Herr R. H. Krause, of the Austrian Telephone Company, writes as follows: "The notice in your issue of the 18th inst., taken from the *Electro-Techniker*, just to hand, is misleading. It is true that the first action for annulment of the patent was not quite successful, the decision being that, whilst the company's action was pending, another action had been decided, by which three important clauses of the patent had been canceled, and therefore the company's action was dismissed. The principal gain was that all telephones made without a soft iron pole were rendered free. Another much more important action, or, rather, petition for annulment, was then instituted, and is still pending, and can hardly be decided under a year. There are also about six more pending, brought by other parties. Apart, however, from these, the Ministry of Commerce, as the patent authority, has recently decided that the use of telephones by an exchange is no infringement of the Austrian patent law. This law prohibits the making in Austria, the importation for purposes of sale, the sale and the exhibition for purposes of sale. The Ministry has decided that, as the companies only use the telephone and buy or import for their *own* use, they are not infringing the patent, and thus your notice is liable to be misconstrued. That it represents the wishes of the patentees is clear, but it is not a fact. It may interest some of your readers to hear that for nearly seven years nobody knew in Austria who was really the owner of the patent, there having been disputes about the rights granted for its sole use to an Austrian firm."

The "Telephone Building."

The new building of the Metropolitan Telephone Company, 16 to 20 Cortlandt street, is nearly completed, and will be occupied in the month of May. The exterior appearance of the building is shown in the cut published in this issue, and the name by which it will be known is "The Telephone Building." The Metropolitan Company will occupy the entire sixth floor for office purposes, and the eighth floor will be used for the exchange, the switchboards of which will extend entirely around the mammoth room, comprising, when completed, a gigantic U, made entirely of switchboards, extending around the light area, in the center of the building. There will be boards for 129 operators, and the work required in getting

NEW TELEPHONE BUILDING OF THE METROPOLITAN TELEPHONE COMPANY, 16, 18 AND 20 CORTLANDT STREET, N. Y.

up this immense switchboard system can be imagined by all practical telephone workers

The entire first floor above the street floor has been leased by President Goff, of the American Electric Manufacturing Company, who will have most elegant and comfortable offices. This floor will be occupied May 1st.

The American Telephone and Telegraph Company, the Empire State Telephone Company, the Hudson River Telephone Company, and the Standard Underground Cable Company will all have offices in the building; also the Ball Electric Light Company.

The building is splendidly constructed, will be lighted throughout by the Edison system, and will have beneath its roof a varied number of electrical workers.

Dangers of the Telephone.

A British medical journal calls attention to the dangers of infection arising from the promiscuous use of the mouthpiece of public telephones. To prevent accidents of this kind, it is recommended that the mouthpiece be disinfected every time that it is used. In other words, some disinfectant fluid should be kept at every telephone station, and the speaker should, first of all, dip the mouth piece into the fluid, and then wipe it with a clean towel.

The Telephone Toll System in Indiana.

Speaking concerning the changes to be made in Indiana and the new contracts now being presented, Superintendent Hockett, of the Central Union Telephone Company, Indianapolis, is reported in an interview as follows:

"The contracts are just the same as the old ones, except that instead of a commission being allowed agents, varying according to the amount of business, they are allowed a commission of 5 per cent. upon the receipts. Our local toll business has not been remunerative, and we cannot afford to continue it upon the old basis for two years while waiting on the legislature, and in order to be able to continue service to the public, it has been decided to revise the schedule of agents' commissions as stated, and to require from patrons of present stations that are continued, or new ones that may be established, an assurance of a sufficient amount of business to save us from loss. For this purpose we will sell coupon tickets, for use in connection with local or city toll business. These tickets are in book form, and each ticket is good for the number of connections stated on its face, when presented in accordance with the contract under which they are sold. They will be sold to anyone who wishes to purchase them, and at a discount of 40 per cent. from their value, computed at the regular or full rate of 5 cents per connection, and are good for local connections at any station in any city or town in Indiana where we carry on a local toll business, regardless of where they may have been purchased; but, being sold at a discount, they are limited as to the time in which they may be used. They are not good at any time for connections from one town to another, nor redeemable after the date of expiration.

"In order that we may have reasonable assurance that a sufficient amount of business will be done at each local station to justify maintaining it, it is expected that our patrons who make use of such station will, at the beginning of each quarter, purchase from us sufficient tickets—good only for connections had during the period to which they are limited—to give such assurance, and where this cannot be had, we will, rather than take the risk as to the amount of business, close the station.

"It is thought that in Indianapolis not less than tickets for 500 connections, limited to three months, should be purchased to justify maintaining a station such as the average.

"The purchase of any number of tickets does not carry with it the right to have a new station established, but we are willing enough to establish them where they will pay; we have opened a number of new ones this month, and have had a force of men at work for the past two weeks building new lines and rebuilding old ones to enable us to open others.

"It is intended to settle with our agents at the end of each quarter, when they will account for the receipts of that quarter, less commissions, in either cash or tickets.

"We are changing agents' contracts as rapidly as possible, and expect to have them all changed by May 1, or the stations closed where the plan is not satisfactory, so as to operate on the new basis from that date."

Regarding the exchanges in smaller towns, operated under the law, Mr. Hockett said:

"In places where we continued to do a telephone exchange business and rented telephones under the law we are closing the exchanges; most of them were barely self-sustaining at our old rates and all have been maintained at a loss since the rate law took effect. We have already closed three such exchanges, and ten more are to be closed next month, the time at which subscribers' contracts can be terminated governing the time of closing. We will for the present maintain a station for toll line business in such places where we can secure an agent to attend to it for a commission upon the receipts."

Erhard's Circulating Battery.

A number of rectangular plates of zinc are covered on one side with lead foil and on the other with a cloth, which acts as a diaphragm. The battery is built up of these compound plates alternately, with three-sided frames of papier-maché, the same size as the plates, the open side being at the top, so that a space is left between each two plates to contain the solution. The two ends are closed by boards; the whole being held together by bolts passing right through. Above the battery is placed a glass vessel containing crystals of copper sulphate and some water. This vessel can be closed at the top, and is provided with a tubulure below, into which are fitted two tubes, one above the other, each of which leads to a distributing pipe with spouts opening into each cell. The battery being filled with water, the cocks on the two tubes are opened, the heavy solution of copper sulphate flow, out of the vessel by one tube into the cells and the water rises through the other tube and dissolves a fresh quantity of the sulphate. The lead plates are at once covered with a layer of metallic copper and the battery then works like any ordinary Daniell's cell. As the zinc is dissolved the specific gravity of the ascending liquid becomes gradually heavier, and, finally, the circulation ceases and the battery has to be recharged.

The largest size of battery consists of 17 cells, and has a useful surface of 450.5 sq. cm. One of these was submitted to ten discharges of from 3 to 8 amperes, and a total output of 305 ampere hours. The E.M.F. was on the average about 15 or 16 volts; the internal resistance for the greater part of each discharge was less than 1 ohm, but rose at the end of each discharge to about 1.5 ohm. In the total of 70 hours' work 8.8 kilos of zinc were dissolved, and 40 kilos of copper sulphate used up; these quantities are in excess of those required theoretically, viz., 6.3 kilos of zinc and 24 kilos of copper sulphate. The experiments on the two smaller sizes showed analogous results, but not so satisfactory as those obtained with the larger size.

Standard Cable in New York Fire Department.

This cable company has done a great deal of work for the city of New York, and recently furnished a number of cables for the fire department. A view is given of the new distributing switch at the central office of the fire department, in which the cable connections are shown, as well as the neat work done. On May 1st the Standard Company moves to new and more comfortable offices in the telephone building on Cortlandt street, where Mr. Geo. L. Wiley will, as before, make his headquarters as manager of the New York house.

Long-Distance Telephony.

All technical difficulties in the erection of long telephone lines are now removed, and the whole question is one of economy. The results obtained by Van Rysselberghe have shown that conversations over long lengths of wire are quite feasible.

The essential point in long-distance telephony is the conductor; the apparatus at either end is of secondary importance. Lord Rayleigh has applied Maxwell's theory to Hughes' practical results on induction, and he shows that for cylindrical wires the change in resistance for a variable current is proportional to the square of the number of alternations and to the fourth power of the diameter of the wire. It is also proportional to the constant of magnetization, which is 1 for copper and about 300 for iron. For copper wires of the sizes used in practice the variation from Ohm's law is not great, but for iron wires it is considerable; thus, with an iron wire 1 mm. in diameter, the resistance is increased about one-fifth for 1,000 vibrations; with 2 mm. wire, for the same number of vibrations, the resistance is doubled; with a 4 mm. wire the resistance is doubled for 300 vibrations, and becomes from 5 to 10 times greater for 1,000 vibrations.

The dependence of the resistance of the line on the number of vibrations of a current in the variable phase is particularly prejudicial for long-distance telephony, because the various notes of the human voice each correspond to a different number of vibrations, and hence the resistance of the line is less for the deep tones with a less number of vibrations than for the high notes with a greater number. For instance, on a 4 mm. iron wire the resistance will be increased 50 per cent. for the note G of 200 vibrations, whilst for its octave G^1 of 400 vibrations, the resistance will be increased 100 to 150 per cent. The deep notes, therefore, come out relatively too loud, and the timbre of the voice is altered It has been proved experimentally, both by the author and by Preece. It is quite clear, therefore, that for long distances, say beyond 200 kilometers, no arrangement of transmitting and receiving apparatus will overcome the difficulties of communication due to the increased resistance of iron wires for currents in the variable phase, but the line must be built of copper wire.

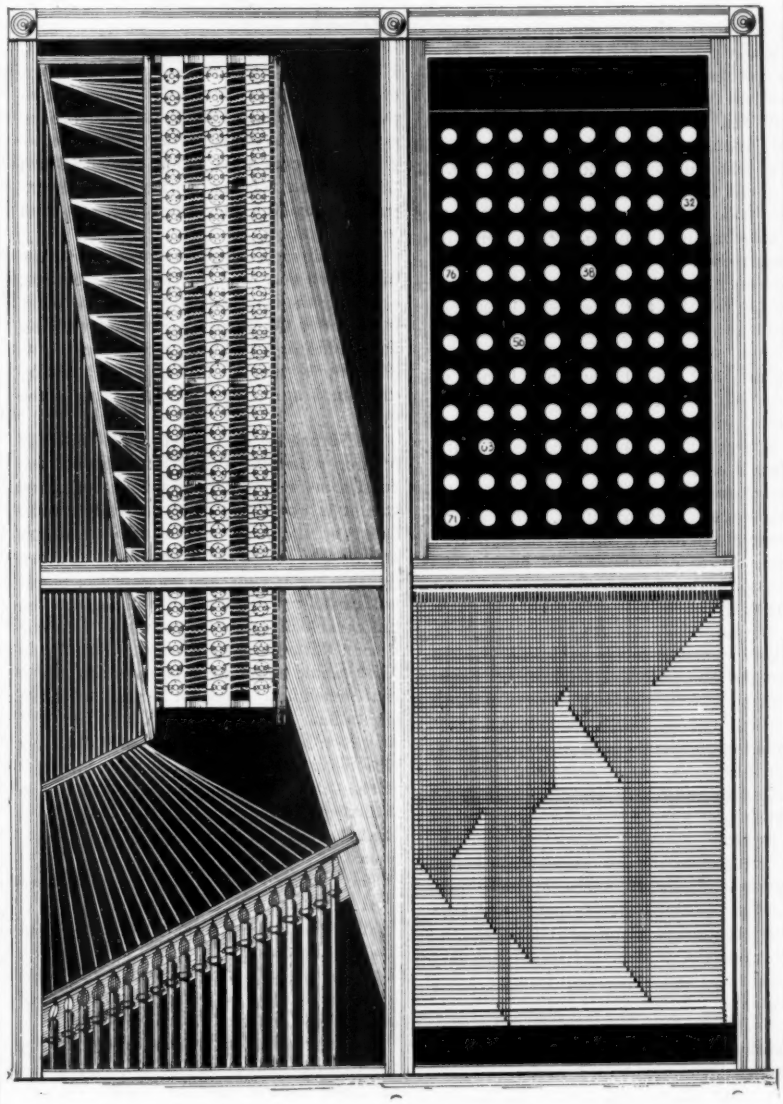
It is also necessary to avoid disturbances from outside, either arising from earth currents or from currents in neighboring wires; for this purpose the circuit should be metallic throughout; or, in other words, the line must be looped; and the insulation should be as perfect as possible, as any leakages introduce disturbances. Where several wires are run on the same posts, they should be arranged alternately on the arms, so as to cross each other, and not be parallel for any distance.

In order to avoid the expense of running a second wire to each subscriber, it has been proposed to use translators, or induction coils, consisting of an iron core on which are wound two coils of wire, one coil being connected to the main looped line and the other to the local wire. This arrangement has not given good results in practice, chiefly owing to the magnetic inertia of the iron cores in the coils, and it is preferable to adopt an arrangement devised by Bliss, in which the return wire is common to several subscribers. Normally, only the single wire is connected up for calling the subscriber, but when he wants to talk the return wire is switched on to the particular instrument in use.

Experience shows that the increased cost of looped lines is made up for by the increased facilities of communication; besides, owing to the increased facility of working, more messages can be sent over the wire in a given time.

Do Electric Currents Injure Conductors?

There is no evidence that the effect of electric currents on conductors of proper magnitude and ordinary low resistance is appreciable at all on the structure of the metal. Professor Thurston says: "I do not believe that the effect is ever observable, no matter what the time and period of application may be. It is probably *nil* on either strength, elasticity, or durability."



OFFICE SWITCH-BOARD IN CENTRAL OFFICE OPERATING ROOM, NEW YORK FIRE DEPARTMENT, SHOWING CONNECTIONS.

The Irrepressible Office Boy.

When the telephone was introduced into the offices of Christendom a great many men sent away their office boys and fancied that they could get on without them. But the office boys came back. Like truth crushed to earth they rose again and asserted their indispensable value. The office boy knows that he is an autocrat, and while he may never presume upon his position outwardly, he carries the signs of authority and of power around with him. He is tardy, he is lazy, he is forgetful, but he looks calmly into the eyes of his reproving employer without flinching. He will stay forty-five minutes on a ten minutes' errand and bob up serenely without thought of an apology. If on his return a superior officer plucks up courage to inquire if he has had a pleasant vacation, he will stare and reply, "What, sir?" with a well cultivated stupidity. If an office boy could be patented who would be warranted to take in, or at least to smile at all of his master's jokes, this world of toil and trouble would be a sunnier spot.—*Boston Advertiser.*

The New York Press on the Annual Meeting.

[From N. Y. *Herald.*]

ELECTRICIANS EVERY ONE—THE FIRST ANNUAL ELECTION AND DINNER OF THE ELECTRIC CLUB.

The first annual election of the club, with a dinner, was the magnet that drew the members of the Electric Club to the Hotel Dam last evening.

As there was but one ticket in the field the election was a peaceable one. Mr. Henry C. Davis was made president; Messrs. G. W. Hebard, J. B. Powell, G. L. Beetle and Thomas A. Edison, vice-presidents, and Mr. C. W. Price, secretary. A large board of managers and a committee on membership were also chosen.

Then they made connections with the dinner and presently became electrified. The singing they indulged in was a good deal louder than the hum of a telephone, and, well—it was more melodious.

Then they made speeches and used a great many queer words.

"We are one hundred strong to-night and all thoroughbreds," said Mr. Charles Dutton, who presided.

He was dead right.

[From N. Y. *Tribune.*]

RAPID GROWTH OF THE ELECTRIC CLUB.

Just a year ago next May the Electric Club held its first annual meeting in the Hotel Dam, Union Square. The membership numbered thirteen, and there were some twenty offices to fill; so all the members were elected officials, and there were still vacancies on the list. Thirteen has turned out a lucky number to begin on, and the club has in one year flourished exceedingly. Thursday night over 100 of the 220 members and several guests sat around the tables in the dining-room of the Union Square Hotel to celebrate its birthday. President H. C. Davis presided. Charles Dutton was all that could be desired as a toast-master, and a great number of prominent electricians were present. The following officers were elected: president, H. C. Davis; vice-presidents, George W. Hebard, John B. Powell, Thomas A. Edison, George L. Beetle; secretary, Charles W. Price; treasurer, Andrew J. Dam. Board of Managers: Henry D. Stanley, M. W. Goodyear, E. T. Gilliland, Willard L. Candee, Charles Dutton, Cyrus O. Baker, jr., H. B. Thayer, E. T. Lynch, jr., Thomas L. Fowler, Stephen D. Field, Henry A. Reed, Frederick A. Gilbert, and George B. Coggeshall. Letters of regret were received from Senator Ingalls, Governor Hill, Mayor Hewitt, Mayor O'Brien, Boston; Allan V. Garratt, Colonel R. G. Ingersoll and others.

Marshall P. Wilder after dinner electrified the electricians. C. L. Buckingham replied for "Our Club"; Dr. Otto A. Moses for "Our Future"; C. J. H. Woodbury for "The Barbarians of the Outside World"; H. J. W. Dam for a "Gentle Protest from the Barbarians"; William S. Hine recited a clever rhyme on "Electrical Nomenclature"; Lieutenant F. W. Toppan, U. S. N., and George M. Phelps, jr., played and sang.

[From the N. Y. *Times*]

ANNUAL DINNER OF THE ELECTRICIANS.

The first annual dinner of the Electric Club took place at the Union Square Hotel last evening, 110 gentlemen sitting at the table, with President Davis in the chair. After the discussion of the menu was concluded, the President gave his place to the toastmaster, Mr. C. M. Dutton, and the diet of words began. The list of toasts included "Our Club," responded to by C. L. Buckingham; "Our Future," by Dr. Otto A. Moses; "The Barbarians of the Outside World," Mr. C. J. H. Woodbury; "Gentle Protest from the Barbarians," by one of them; "Electrical Nomenclature, a Rhyme," by William S. Hine, and songs by Lieut. F. W. Toppan, United States Navy, and George M. Phelps, Jr. Marshall P. Wilder entertained the gathering with his original drollery, and informal speeches were made by Col. Gilbert—who discoursed learnedly upon flies—ex-Senator Robert McCarthy, and others.

[From N. Y. *World.*]

THE ELECTRIC CLUB'S OFFICERS.

The Electric Club held its first annual meeting at the Hotel Dam, Fifteenth street and Union Square. About one hundred and twenty-five members were present, representing the electrical interests of every important city in the United States and Canada. The polls were opened at 4.30 and closed at 6.30, resulting in the following gentlemen being elected for 1887-88: president, Henry C. Davis; vice-presidents, George W. Hebard, John B. Powell, George L. Beetle, Thomas A. Edison; secretary, Charles W. Price, and treasurer, Andrew J. Dam.

New Gas Pipes Needed.

The accident from the escape of gas in two houses in Second avenue is one of a kind that does not happen very often. Yet it happens too often, and shows what may happen at any time in any house. Every now and then we have reports of an accident due to an explosion of gas in a cellar, or some unused part of a house that has been filled with this dangerous vapor escaping from a leaky pipe. If there is an explosion it is bad enough, but if there is not an explosion it is worse. But the gas escaping when all are asleep is not observed, and suffocates people in their beds. The truth is, says the N. Y. *Journal*, that it is about time all the underground gas pipes were renewed. They have been down so long in the old streets that they are rusted out, and there is no systematic inspection or regular method of renewal. That would take some of the money that now goes for dividends, and to save that money the people must be in peril.

ELECTRICAL AND SCIENTIFIC

* * Dr. Brown-Séquard, the celebrated physiologist, says he has discovered that the moment the skin of the neck is cut all sensibility disappears, and that the best means of resuscitating persons asphyxiated by smoke, coal gas or water, is to apply galvanism to the skin of the neck—a method he has successfully employed.

* * The subject of wetting fuel was under discussion in the New Arc Literary Society. The discussion had waxed warm and bid fair to divide their organization, when the door opened and in walked Prof. Smythe. To him the matter was referred. "There have been some," began the professor, "who have claimed that they could get heat and power out of water. But the fulfillment of their claims is as far off as ever. If you let a weight run a clock or a sewing machine or anything else, when that weight has run down it cannot do any more work until it is lifted or wound up. In the same way water is not fuel, but the waste product of combustion of two gases. This waste product, water, cannot be burned. Still if you do work upon the water it can be separated into the two gases, and these burning again to water can give out heat or do work. But just as much work is required to separate the water into these gases as is given out when they turn into water again. You might as well try to make tea from tea grounds, or cider from pulp, sardines from herring, or chamois from sheepskin as to burn water," and he excused himself to read a paper before the society for the propagation of Synchronistic Theosophy. Senter, however, said that his experience was that fine fuel was most effective if wet before feeding to the furnace; that the fine particles were held together by the water, and not driven out of the stack.

* * The Coast Survey has just started into the summer field of labor four parties to complete the "transcontinental geodetic arc." This great line of triangulation has now several gaps in it. When the arc is completed it will be the greatest surveying achievement in modern days. Its scientific value in computing exact distances, and its astronomical uses are understood by disciples of Gunter. The original base is a firmly planted stone monument on Kent Island, opposite Annapolis. Thence the arc has been carried through Parkersburg to Cincinnati. From St. Louis the triangulation has progressed into Indiana to within ninety miles of the Cincinnati end. Another series extends from Kansas City to Salina, and another from Colorado Springs to within 300 miles of Salina. From San Francisco the lines run through Sacramento into Nevada, and thence to the south of Salt Lake City. The parties which now start out begin work —one in Ohio to measure west and one at the Indiana end to measure east, one in Kansas to close the Salina gap, and one at Mt. Nebo, in Utah, to work toward Colorado Springs. The accuracy observed in this geodetic measurement would astonish the ordinary farm surveyor. A distance of 500 miles will not show an error of five feet. The series of triangulations along the Pacific coast are the most complete and the sides of the triangles are the longest known in the world of science. M. Perrier was made a member of the French Academy for securing a line 168 miles long in the France-Algiers surveys, but the American Coast Survey accurately established a line 192 miles long from Mount Shasta to Mount St. Helena. One of the party held a twelve inch mirror from his station on Mount St Helena, and the observer, who stood 14,400 feet above sea level on Mount Shasta, saw the sun's reflection from the mirror through an ordinary theodolite, and it resembled the North Star. The surveyors who now set forth will carry electric bulbs in place of lanterns to furnish light while reading night observations. The whole apparatus will be contained in a box not more than six inches cube.

Reponse by Dr. Otto A. Moses to the Toast of "Our Future," at Annual Meeting of the Electric Club.

MR. PRESIDENT: We have been much amused by the allusions of the preceding gentleman to the wonders found by one Lemuel Gulliver in the famous Island of Laputa, and the felicitous manner in which he coupled the prophetic character of my patronymic and the toast to which I now respond. His compliment, "that when I struck the rock of our future, something worth remembering would flow," and the flattering vein in which our toast-master has introduced me, have so divided my attention that, like the famous and patient animal in the fable, I halt between these two opinions.

In dealing with so unsubstantial a thing as our future, I cannot hope to be more successful than the Laputan philosopher who sought in vain to extract sunbeams out of cucumbers, although the cucumbers and turbot of which we have just partaken may (who knows?) have already transmitted some phosphorescence to our brains. Nor can I hope, in speculating on our future, that my suggestions will serve as a pillar of cloud by day and of fire by night, to guide you to our promised land. But this much I will say, referring to Mr. Buckingham's remark, and out of regard to my great ancestor, that, had that illustrious man and student of nature but lived until to-day, he would have been recognized by this club as the first discoverer of the incandescent lamp. For are we not told by the most reliable authority that "when the angel appeared unto him in a flame of fire out of the midst of a bush, he looked, and behold, the bush burned with fire; and the bush was not consumed. And Moses said, I will now turn aside and see this great sight, why the bush is not burnt." This is excellent precedent, and it has often struck me with surprise that the officials of the German patent office, who are very thorough in looking up references, have not cited this as a glaring case of priority of invention. But let me not stray aside from my subject.

In many respects the toast to which I must respond is an agreeable one. In "our future" "no pent-up Utica is ours." I can, as may no other inventor, draw upon my imagination without fear of interferences or injunctions. I will paint the lily, and add perfume to the rose. And yet I never speculated in futures in my life—with but one exception, when I married—and for some time after.

In exercise of my prerogative I might run over the list of successful societies and academies—clubs, all of them—which have been centers of literature and science, and, without fear of denial, I might predict for you a solid and resplendent future. I might paint for you our Davis sitting in the chair of a Rumford; or I might describe you as another Royal Institution, dispensing gifts of knowledge to a grateful metropolis.

I could prophesy as your "manifest destiny," a club-house located in some central yet quiet neighborhood, where, amidst all the enjoyments that make club life agreeable, the studious soul could find seclusion. Full libraries and reading rooms, and well stocked laboratories, where, within ear-shot of the decorous merriment of our anniversary and other dinners, good souls might be doing penance for our revelry by making experiments and discoveries that would immortalize the locality and the occasion. We might have well filled museums, and perfectly appointed testing rooms, with learned committees to consider "things of good report," whose opinions might be instrumental in maintaining the character of all our worthy electric enterprises.

Now to speak in "sad and serious vein" (and to conclude) it is but proper that you, who represent so many great and cognate interests, should be able to meet each other on common ground. You who are helping to make this time known as the age of electricity should surely be able to regularly exchange your thoughts in some place dedicated to the advancement of your common science. And it is above all most proper that our future abiding place should form one of the ganglions by which this metropolis connects itself with the uttermost parts of our country.

The Brush Plant of the U. S. Steel Cruiser "Boston."

OFFICE OF NAVAL INSPECTOR OF ELECTRIC LIGHTING,
19 MANN AVE, NEWPORT, R. I.,
April 18, 1887.

Chief Bureau of Navigation, Navy Department, Washington, D. C.

SIR:—I have the honor to report that I have made a final inspection of the installation of electric lights by the Brush Electric Company, on board of the cruiser "Boston," in company with Mr. L. Porsh, the representative of the company.

In addition to the 210 lamps contracted for, 56 have been added by my direction, making a total of 266; 6 portable connections, without lamps, have also been supplied and fitted in addition to work called for by the contract.

During this and other previous inspections, I have been much impressed with the thorough and excellent work of the Brush Company in everything that pertains to the installment of the plant on board. I desire to place on record my opinion that the Brush Company has spared neither time nor expense in making the installation first-class in every respect.

The following items in connection with the installation may be of interest to the bureau:

During the final inspection I had the plant in operation the larger part of two working days, and for one hour during the night. The ship is very well illuminated indeed; the lamps are brilliant, and pleasant to the eye.

The dynamo is compound wound, and only requires when running such a position of the brushes as will prevent sparking, and care that it is not overloaded; the latter is indicated by the heating of the field magnet coils. The electrical dimensions of the dynamo are 92 volts and 98 amperes; nominal capacity, 150 16 candle power lamps, but capable of working up to 175 for some hours; during the trial, lamps amounting to 3,600 candle power were in operation for a time; standard speed of armature, 1,190 revolutions per minute; wood pulley, 12" diameter; weight, 1,600 lbs.; 600 lbs. less than the dynamo on board of the "Atlanta."

The lamps of the ship are very uniform in brilliancy and indicate that they have been carefully selected and vary little in resistance.

The insulated light leads that have been used are Nos. 8, 10, 14, 16, and 18.

The light in the warrant officers' messroom has been disconnected by ordnance men while working at gun tracks and was left in this condition by me, it having been properly installed by the Brush Company, once.

All spare parts and articles were placed in the electric store-room by me, and a list of them turned over to Lieut. Comdr. Thomas Perry, U. S. N., the executive officer of the ship. I have, since returning to New York, forwarded to Mr. Perry a complete list of the location, fixture, candle power, etc., of every lamp in the ship.

I earnestly recommend that the plant be operated every day until the ship goes into commission, all parts kept in order, and the lamps and fixtures be inspected and cleaned daily. In this way not only will the plant be kept in order and be ready for use when wanted, but the men who are to run it will become familiar with their duties.

Very respectfully,
R. B. BRADFORD,
Lieut. Comdr. U. S. N.

Gilbert's Telegraph Wire Insulators.

A piece of wire about 6 inches long is placed alongside the line wire and the ends bound with fine wire and soldered. In this way for 6 inches the line wire is practically double. This is spread apart by an instrument carried by the lineman and slipped onto a grooved glass insulator. For terminals of telegraph and telephone lines a glass ball having two grooves at right angles to each other, around one is placed a loop made in the end of the line wire, in the other a loop fastened to the pole fixture or insulator. By an extension of this method using a number of glass insulators, great freedom from leakage is obtained.

PERSONAL NOTES.

Mr. John I. Sabin's thoughtful gift of flowers to the members of the Electric Club was one of the features of the annual dinner that will long be remembered.

Messrs. W. D. Sargent and E. J. Hall, jr., have returned from the Bahamas, both having gained several pounds of flesh, and greatly improved in health by the vacation.

Mr. Geo. F. Durant, general manager of the Bell Telephone Company, of Missouri, and his wife were New York visitors last week, guests of Mr. Clark B. Hotchkiss.

Mr. T. A. Edison and Mr. E. T. Gilliland, with their families, have started North from their Florida home, and will occupy their respective residences, Mr. Edison at Llewellyn Park, Orange, N. J., and Mr. Gilliland on 74th street, New York city, early in May.

Mr. R. T. McDonald, of Ft. Wayne, Ind., one of the most active men in the electric lighting business, was a New York visitor last week. The Ft. Wayne Jenney Company, through his efforts as general manager, is getting a large share of the electric light business.

Mr. General Superintendent Reilley, of the New York and New Jersey Telephone Company, rumor hath it, has at last succumbed to fate, and will soon be married. Brooklyn beauty won him, and that fair city will be the home of the happy couple.

Mr. Cyrus O. Baker, Jr., of the platinum manufacturing house of Baker & Co., Newark, combines good looks with business sagacity, and has built up a very large trade in electrical circles during the past year. Mr. Baker is an active worker in the Electric Club, and at the last election was re-elected to the Board of Managers.

Mr. Chas. Dutton will be known as the Electric Club's toast-master hereafter. He proved the right man, and deserves great credit for the enjoyable manner in which the club's programme was carried out. There were 110 men present, and each and every one was willing to get the laugh on the genial Dutton, but no one made the second attempt.

Cards are out announcing the wedding of Mr. H. B. Thayer, of the Western Electric Company of New York city, to Miss Carrie M. Ransom, a charming young lady of Rochester, N. Y. Mr. Thayer will be the recipient of numberless good wishes, and none will be more sincere than those from the staff of the REVIEW.

Mr. Arthur Newton, of the Eddy Electric Manufacturing Company, Hartford, was in New York this week looking after a large contract for dynamos for electro-plating. His company does the largest business in this line of any in the country, and there is no better dynamo for electro plating than the one they manufacture.

A wide circle of friends in this and foreign countries will be glad to learn of the restored health of Prof. C. H. Haskins, one of the most successful and electrically able of the pioneers of the telephone. Prof. Haskins, who is a very wideawake and thorough electrician, is still the active president of the Wisconsin Telephone Company, but at the present makes his home in the elegant Chelsea flats in New York city.

Mr. H. L. Storke, the genial president of the Empire State Telephone Company, is greatly pleased over the fact that the Assembly Committee on Ways and Means has resolved by a vote of 8 to 3 to report adversely Senator Cullen's bill reducing the rates of the telephone companies in this State. They resolved to recommend the appointment of a special committee by the Speaker to investigate the alleged high charges. Thus ends telephone legislation in this State this year.

Central Electric Light Stations at Berlin.

At the present time there are seven central stations in Berlin at work, though they are not all supplying the maximum number of lights for which they are intended. In the Schadowstrasse station are two dynamos working 500 glow lamps and 6 arc lamps; in the Friedrichstrasse, four dynamos supplying 1,800 glow lamps and 6 arc lamps; in the Markgrafenstrasse are 15 dynamos capable of supplying 8,000 glow lamps and 26 arc lamps; in the Mauerstrasse, seven dynamos for 6,000 glow lamps and 36 arc lamps. These four stations are worked by the German Edison Company. The Berlin Lighting Company has a station with 7 dynamos supplying 900 glow lamps and 100 arc lamps in the Ausstellungs Park, and another with 8 dynamos for 4,000 glow lamps and 38 arc lamps in the Beuthstrasse. The seventh station belongs to Messrs. Siemens & Halske, in the Kaisergallerie, and has 3 dynamos for 3,000 glow lamps and 40 arc lamps.

In the Mauerstrasse station are at present three water-tube boilers and three compound steam engines, each of 150–170 actual horse power. Each engine drives direct two Edison dynamos, made by Siemens & Halske, for 500 lights each, and also a countershaft, from which are driven four Siemens dynamos, each for 12 arc lights. Each dynamo is connected to the main switchboard by three cables, two for the main current and the third for connection to the resistances to be inserted into the exciting circuit. All the dynamos send their current into a common lead, built up of 12 copper strips, of about 50 mm. total area, which is connected to the 20 distributing mains. By means of suitable commutators the difference of potential at the terminals of each dynamo, as well as at various points in the circuit, can be measured on the same voltmeter. Each main conductor is fitted with a double-pole switch and a safety fuse.

The station in the Kaisergallerie has two boilers, three 80 horse power engines, and three Siemens dynamos, each for 500 amperes and 65 volts. The wires are partly insulated in the cellars, and partly bare wires on insulators for the upper parts of the building.

The Markgrafenstrasse station has six engines, each driving two Edison 500 light dynamos. The distribution is made on the three wire system by means of Siemens & Halske's lead-covered cables. These cables contain, besides the main conductor, a small insulated wire, by means of which the E.M.F. at various points in the network can be determined directly from the machine room. There are the usual switches and measuring instruments for controlling the working.

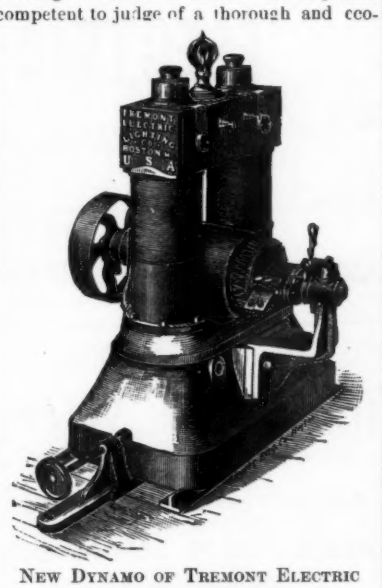
Dynamo Electric Motors.

In a paper recently read by Mr. Stephen D. Field before the Electric Club of New York, this well-known electrician predicts a bright future for dynamo electric motors. By this he means the organization of apparatus wherein a stationary steam engine is used to produce dynamo electric currents, and, by conversion in dynamo electric motors, to reproduce the power of the steam engine at distant places. The numerous new designs of constant speed motors, self-regulating motors, and motors with differential winding, Mr. Field criticizes as schemes to use current for the purpose of breaking itself—an arrangement which, he justly says, has about the same mechanical economy as would be obtained by admitting steam simultaneously on both sides of the piston of a steam engine whenever it had a tendency to run too fast. His plan is simply to use any continuous current dynamos as motors, only putting in more iron, and balancing the magnetism in the armatures and field. If this is done, he predicts the time is not remote when small steam engines will be unheard of, and large ones known only in localities where cheap fuel abounds.

Mr. Field's suggestion should not be overlooked, if electricians wish to introduce economical dynamos. It is extremely desirable to replace the steam engine by the dynamo, which has none of the dangers and nuisances attending the former. But this can only be hoped for when the dynamo can be constructed and operated economically.—*New York Herald.*

Dynamo of the Tremont Electric Lighting Company, Boston, Mass.

The exhibit of the Tremont Electric Lighting Company's incandescent system of lighting at the exhibition in Worcester is attracting universal attention from all parties competent to judge of a thorough and economical system of electrical lighting, as well as those who contemplate its use in the immediate or distant future, judging from the many orders received and inquiries made since the installation has been in operation at the exhibition.



NEW DYNAMO OF TREMONT ELECTRIC LIGHT CO., OF BOSTON.

Some of the advantages claimed by the owners of this system are given below:

First, and most important of the advantages, is the perfect automatic control of the electric current, producing the light without any device whatever outside of the dynamo itself, therefore doing away with resistance coils, amperemeters, voltameters, self-regulating machinery, and, more than all, a sleepy or incompetent attendant to closely watch all this paraphernalia, which, if not closely watched and promptly attended to, is of no use whatever, as the principal difficulty in running an electric light plant is to maintain, under all circumstances, a steady current in each lamp, whether one light or the entire capacity of the plant is brought into use. This the Tremont dynamo does, without even looking after or manipulating in any way, from month to month.

Concerning the weight of the dynamo, the second claim is made that it is less than one-quarter weight of any other make producing the same current.

Third.—The claim is made of its great efficiency in producing light, and that it gives a greater number of lamps per horse power than any other system of like capacity.

Fourth.—Each dynamo is provided with a fusible alloy plug, carrying the entire electrical current, which fuses at 350 degrees Fahrenheit, therefore preventing any liability by fire, by short circuit or otherwise, as it requires 900 degrees Fahrenheit to produce fire.

Fifth.—The entire plant is complete in all of its appointments—fusible plugs, switches, insulation, lamp-sockets with or without switches, shade-holders, etc.; in fact, everything pertaining to a thorough system of incandescent lighting.

The dynamo has several novel features. The field magnet cores are of thin soft sheet iron rolled up till a cylinder of desired size is obtained. The yoke and pole pieces are sufficiently heavy to carry the magnetic lines generated in the cores without loss. The neutral point on the commutator is unusually large, there is no sparking at any or no load, and consequently no necessity to change the position of the brushes. This is not always attained in self-regulating dynamos. The dynamo is shown in our illustration.

The factory is equipped with the most improved machinery, besides tools especially designed for the manufacture of this system. The Tremont system, although a new one, is, we think, a thoroughly good one, and will undoubtedly receive a large share of the public patronage.

—— The Gülcher Company of Vienna (Austria), is installing the electric light in the extensive printing establishment of the Madrid illustrated paper *La Illustracion*. There will be 206 glow lamps of sixteen candle power.

—— "High wages," remarked an engineer, "I wish I had higher, but that's not all to think of. An acquaintance of mine was in to see me a few months ago and said he had a chance to go to China to run an electric light plant in the emperor's palace for $150 per month and found. I heard yesterday they cut his head off. I'm glad I staid here."

—— The electric light and power installation at the Hotel de Ville, Paris, is being extended. Up to the present there were two 65 horse power engines in use, driving dynamos which served for lighting a portion of the building, and for the working of ventilating fans by means of motors. This generating plant is placed in the cellar of the building. Two more engines of the same power, and corresponding dynamos, are now being put down in the neighboring Loban Barracks, and the current will be employed in lighting the great hall, which is being fitted with sixteen electroliers of seventy-two lamps each, and some adjoining rooms, containing in all fifty electroliers of eighteen to twenty-four lamps each. The wiring is arranged on the overlapping principle, so that each room is supplied from at least two different dynamos and engines, with a view to preventing total darkness in case of a break-down. The contractor for the work is M. Chretien, who is well known in electrical circles as the author of a project for an elevated electric railway in Paris.

—— K. Whyet was a thoughtful man, a capitalist ready to investigate every new scheme; but he first in every case consulted his old instructor, A. C. Keurate, before investigating. Much pleased with the description of a scheme to drive dynamos by a falling weight wound up regularly by a servant, he called on his friend and explained the system. "Don't you think there's millions in it?" "Yee-e-s," mused the Professor, the hard work comes in getting the millions out of it. A good stout lackey can drive a dynamo on a stretch to light a 5 candle power incandescent lamp, or, he can wind up a weight that will do about as much when falling again, there being some loss from the friction of pulleys, gearing, etc. Remember that the man must work at the crank full as many hours as the light is burned. So, you see, the whole affair is impracticable; something like the improved method of rapid pedestrianation by the use of boots one township long. But I'll tell you a scheme. Ten to twelve strong convicts could run an arc light. Let them be set at that work and illuminate the dark streets of the cities. Then the problem of convict labor will be electrically solved."

Electric Light Dialogue.

Scene. Hotel office. Enter agents of the Sphere and Broom Electric companies.

Sphere Electric Light Company's agent—"Howdy? I had the pleasure of falling in with some of your people a few days ago."

Broom Electric Light Company's agent—"Yes, we get around most everywhere. By the bye, what are you charging per lamp, dynamo included?"

Sphere—"300 shekels per light."

Broom—"It is not what you can get?"

Sphere—"I believe in high prices."

Broom—"You do. You haven't sold plants lately less than 20 shekels per lamp?"

Sphere—"No, we are willing other companies should make all the presents."

Broom—"And you did not say that Broom system could not hold a rush to your light?"

Sphere—"No, your system is the next best to mine."

Broom—"Let's smooth the commutator," and in a few minutes a sound like that of the air brakes was heard.

In a recent note London *Industries* says that the Gaulard & Gibbs transformers are going to be worked in Belgium by a powerful syndicate of financiers, and that, on the other hand, the Zipernowski, Deri, and Blathy system is meeting with considerable favor in that country.

ELECTRIC LIGHT NEWS

—— Electric lights have done a great deal toward purifying Madison Park after dark.

—— The Brush Electric Light Works, Cincinnati, have been burned; loss of $65,000.

—— A committee on lighting the Paris Exhibition of 1889 has reported favorably on a plan for the use of every known means of illumination. The total amount of light to be furnished is estimated at 2,850,000 standard candles, said to be "upwards of five times the intensity produced by the whole of the gas lamps of Paris."

—— The village of Mount Vernon has been treated to electric lights for two months past. As a sample of what the lights will do, a few nights ago the company supplying the light cut it off, to let the people observe the contrast. The result was so surprising that a loud demand has been made for the continuance of electricity, and the Board of Trustees will probably make a contract with the company.

—— The post-office corridors, formerly the gloomiest places in all New York, have been fitted with double lines of electric lights in the place of the lonesome-looking gas jets that formerly struggled with the gloom. One can see to read the address on a letter now at night. Electricity has replaced gas throughout the entire building. The United States Illuminating Company did the work putting in the Weston incandescent lamp.

—— At a meeting of the Cape May City Council recently it was nearly 11 o'clock when the real question of the night came up. Two bids were received for lighting the streets, one from the Cape Island Gas Company and the other from the Franklin Electric Light Company. After a heated discussion of about an hour the bid of the Franklin Electric Light Company was accepted, with but one vote in opposition—Mr. Haynes—and a contract was ordered signed for one year from May 15 for $3,800. When the result was announced there were cheers and stamping of feet.

—— In the Rue St. Honoré, Paris, there is a large establishment called Arena Aeronautique, which is in part a public bath, and in part a circus for aquatic performance. The electric light has been fitted in this building on a magnificent scale, to the entire exclusion of gas; but the neighbors brought an action against the contractor, on the grounds that the electric light machinery created a nuisance in the district, and this action ended in an injunction to discontinue the electric light. The owner was, therefore, obliged to return to gas. This is the third legal proceeding of this nature against electric light contractors in Paris within the last few weeks.

—— Whilst electric lighting enterprise in Vienna is burdened with all kinds of difficulties, the gas companies are paying handsome dividends. One company has declared 11 per cent. and another 8 per cent. The difficulties thrown into the way of the Imperial Gas Association by the Vienna Town Council are still far from a satisfactory settlement. This company petitioned Government for interference on their behalf, but the petition was refused. Matters are rather more prosperous to the electric light industry in Salzburg, where the Commune give every assistance possible to the contractors. They have granted the use of the streets for the laying of mains without any difficulty or charge; and it is expected that within three months from now this town will enjoy a general system of electric lighting. The town of Neuhause, in Bohemia, is also to receive a central station for the supply of electric light by means of glow and arc lamps. The installation in Gastein is also being rapidly pushed forward, and will probably be in working order in the coming season.

ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING APRIL 19, 1887.

361,265 Branch conduit for electrical conductors; Josiah M. Clokey, Decatur, Ill.

361,270 Automatic electric damper regulator: Edward N. Dickerson, Jr., New York, N. Y.

361,273 Fusible connection for armatures or electric generators; and 361,274, Electric motor; James W. Easton, New York, N. Y.

361,275 Electric signal for weighing scales; Edwin S. Enyart, Ottawa, Ill.

361,276 Subway for electric current wires or cables; James McFarlane, Malden, Mass.

361,319 Underground conduit; Isaiah Paxson, New York, N. Y.

361,356 Duplex telegraphy; George W. Gardanier, New York, N. Y., assignor to the Baltimore and Ohio Telegraph Company, Baltimore, Md.

361,364 Duplex telegraph; and 361,365, Calling apparatus for telegraph circuits; Joseph W. Larish, Buffalo, N. Y., and William Maver, Jr., Jersey City, N. J., assignors to the Baltimore and Ohio Telegraph Company, Baltimore, Md.

361,455 Safety lamp for use in mines and other places; Miles Settle, Snow Hill, Darcy Lever, near Bolton, county of Lancaster, England.

361,481 Telephone; Charles S. Bell, Columbus, Ohio.

361,498 Method of and apparatus for signaling through submarine cables; Moses G. Farmer, Eliot, Maine.

361,511 Combined clock and alarm for hotels etc.; Arthur B. Harford, East Saginaw, Mich.

361,587 Electrical induction apparatus; Milton H. Gross, York, Pa.

361,663 Electric arc lamp; Gustav A. Wiese, San Francisco, Cal.

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BUSINESS NOTICE.

"In making the statements which follow we can verify each and all of them as facts. Mr. Edward P. Thompson, of Temple Court 17 Beekman St., New York, is a good man to bring your patent cases to, for he is thoroughly versed in all the ins and outs of a Patent Attorney's duties. The following are some of his qualifications: Graduate of Stevens Institute as Mechanical Engineer. For four years tutor of classes of young men in mathematics and experimental physics at Elizabeth, N. J. Served professionally as Electrician and Chemist in the Swan Electric Company of New York for two years. Because of past successes as a Patent Attorney at 18 Park Row, New York, was appointed, to succeed N. S. Keith, of the patent agency of the *Electrical World* and Associate Editor. N. S. Keith is known as the Translator and Reviser of Schellen's Treatise on "Dynamo Electric Machinery." Mr. Thompson for two years personally prepared and prosecuted all the patent business of *Electrical World's* Patent Agency, and is the author of a series of articles in said paper upon "Analytical and Systematic Method of Inventing," which were widely known and favorably received. Mr. Thompson is a member of American Institute of Electrical Engineers and American Society of Mechanical Engineers. He is author of the "Expansion of Polynomials," which the ablest mathematicians of the world universally commend."
—*New York Observer*.

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W. J. Buckley, Mgr. Ft. Wayne Jenny El. Light Co.
Thomson-Houston Electric Light, Herbert Wadsworth, Manager Western Office.
Brush Electric Co., Alex. Kempt, Special Agent.
Excelsior Electric Co., C. J. Reilly, Western Mgr.
Sperry Electric Light Motor & Car Brake Co., 201 Royal Insurance Building
J. H. Reid, General Manager of the Mather Electric Light Co., Chicago.
Wm. H. Purdey, Comm. of Public Works, Chicago.
John Mab, Chief Engin'r of Board of Trade, Chic.
C. J. Meimes, Gen'l Sup't Thomson-Houston Light, Omaha, Neb.
J. A. Corbey, St. Joe Electric Light and Power Co., St. Joe, Mo.
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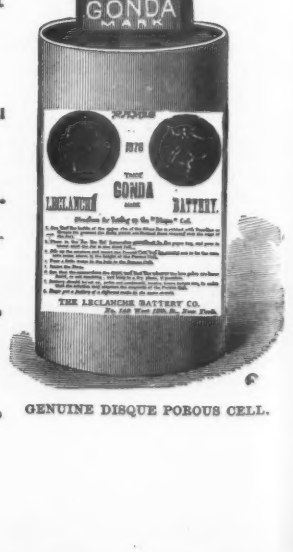

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